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THE DETERMINATION OF SOME VISUAL FUNCTIONS OF A UNILATERALLY COLOR-BLIND SUBJECT: METHODS AND RESULTS*[1]

Department of Psychology, Columbia University; and U. S. Naval Medical Research Laboratory

C. H. GRAHAM, H. G. SPERLING,[2] Y. HSIA, AND A. H. COULSON[3]

A. INTRODUCTION

Three articles have presented data on, respectively, threshold luminosity (Graham and Hsia, 1958a), critical flicker frequency (Berger, Graham, and Hsia, 1958a), and binocular brightness matches (Berger, Graham, and Hsia, 1958b) of a subject who has a normal vision in one eye and dichromatic vision in the other. In addition, a number of articles embodying reports given at various scientific meetings and published in accounts of these meetings have also appeared (Graham and Hsia, 1958 *b, c, d, e, f,* and 1959). The present article gives the basic description of the experiments and data on color mixture, color naming, wavelength discrimination and binocular color matching in this subject.[4]

B. COLOR MIXTURE

While the entire spectrum for normal color vision can be specified by a minimum of three color mixture primaries, for dichromats it is specifiable in terms of two primaries. The term "specify" is used because in the additive color mixture experiment the normal observer is unable to match a pure spectral color with any combination of any number of primaries, but if the

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Part of the research herein reported was done at the U. S. Naval Medical Research Laboratory, U. S. Submarine Base, New London, under Bureau of Medicine Project Number NM 22 01 20. We are indebted to the late Commander Dean Farnsworth and Captain J. Vogel, then Officer-in-Charge of the Medical Research Laboratory, for their cooperation in these experiments.

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[3] Now at Department of Preventive Medicine, School of Medicine, UCLA.

[4] The testing procedures used in the initial examination of our subject are detailed in Graham and Hsia (1958a). For a history and analysis of observations on unilaterally color-blind individuals, see Judd (1948).

spectral color is desaturated by adding to it a small amount of another spectral color, the normal observer will be able to match it with a mixture of two primaries. The desaturating color is then taken as the third primary and computed as negative. The wavelengths of the three primaries—the desaturating one and the two others—do not matter so long as no one of them (appropriately desaturated) can be matched by a combination of the other two. The dichromat, according to Pitt (1935), can match any spectral color whose wavelength is shorter than approximately 500 mμ, with a single primary providing a small amount of a second primary is added to it for desaturation. For wavelengths longer than approximately 500 mμ, Pitt found that the dichromat can match the pure spectral color with a combination of two primaries without desaturation.

It is important to have color mixture data on each eye of our unilaterally color deficient observer in order (*a*) to discover whether or not satisfactory specification of all spectral colors can be obtained in her color-blind eye with two primaries, (*b*) to provide evidence on whether or not the normal eye falls within the well-determined limits of normal spectral color matching (Wright, 1947), and (*c*) to examine the details of the mixture functions in terms of degree of similarity to known types of color deficiency. Because of our apparatus arrangement, it was possible in this study to determine directly, for the first time on a color-blind eye, the energy quantities of the primaries required to match both the chromaticness and luminance of a spectrum of known radiance. Such a determination permits a comparison of the two eyes and (when data of this type on characteristic binocular color-blinds become available) will permit comparison with other color-blind individuals in terms of a luminous efficiency scale which does not presuppose the additivity law of luminances. Data such as these will, in fact, serve to evaluate that law for color-deficient vision.

The apparatus used for the color mixture work was the tristimulus colorimeter designed by G. A. Fry for the U. S. Naval Medical Research Laboratory. Its calibration and modification for flicker photometry and energy based color mixture measurements have been described by Sperling (1958). The procedures used in obtaining data on the normal eye were the same as those described by Sperling for flicker photometry and color mixture, except that a 530 mμ green primary was used to facilitate comparison with Wright's data (1947). The 460 mμ blue, and 650 mμ red were the same as primaries previously used. For the color-deficient eye, the flicker photometric luminosity determinations were again the same but the mixture data were obtained with only two primaries, the blue of 460 mμ and the red of 650 mμ red. The 530 mμ green primary was blocked off after a number of preliminary trials at matching the different parts of the spectrum with all three primaries showed greater variability and were called less satisfactory matches by the subject than ones using only the red and blue primaries.

In the violet, data were obtained by two different procedures. In one, colors from the violet part of the spectrum were matched, without desaturation, by a combination of the blue and red primaries. In the other, the red primary was added to both sides, according to Pitt's procedure (1935), to provide desaturation of the standard. The algebraic sum of the positive and negative red is reported.

For the luminosity measurements on each eye, the subject was first dark adapted for 7 minutes. She then adjusted the luminance of the spectral light, which was alternated with a constant white light standard of 500 trolands (uncorrected for the Stiles-Crawford effect, i.e., trolands = candles per square meter × pupil area in square mm). The wedge was set in the spectral beam to produce fusion at the lowest possible rate of alternation. Twenty-eight spectral bands were presented in a sitting in order from red to violet or violet to red, the experimenter reversing the direction for each session in the four sessions on each eye. The means of the four wedge and filter settings were taken as producing an equal brightness spectrum. The product of the radiance in each spectral band (N_λ) with the mean wedge and filter transmittances (T_λ) gave P_λ the energy at constant luminance. The reciprocal of P_λ multiplied by a constant gave V_λ the relative luminous efficiency:

$$(1/P_\lambda)\ K = V_\lambda \qquad (1)$$

The data for our subject's color-blind and normal eyes are given in Table 1.

The same 28 spectral colors that were used for luminosity determinations were used as the spectral standards for color mixture. The wedge and filter values required for equal brightness by flicker photometry were introduced and the subject then matched both the chromaticness and the brightness of these standards by adjusting the luminosity of the primaries in the adjacent field, in some cases adding a desaturating primary to the standard. These wedge and filter settings of the primaries, together with their associated radiances, constitute the basic information for the color mixture curves.

The following discussion summarizes the mathematical treatment of the color mixture data:

(*a*) The radiant flux quantities, p_r, p_g, p_b, of the three primaries, R, G, B, required to match the equal brightness spectrum were determined by complete match:[5]

$$P_\lambda\,(\lambda) \equiv p_r\,(R) + p_g\,(G) + p_b\,(B) \tag{2}$$

(*b*) Reduced to unit radiant flux the tristimulus values of the equal energy spectrum for our primaries were:

$$1\ (\lambda) \equiv \frac{p_r(R)}{P_\lambda} + \frac{p_g(G)}{P_\lambda} + \frac{p_b(B)}{P_\lambda} \tag{3}$$

(*c*) To produce trichromatic coefficients in the WDW system (W. D. Wright, 1947) for comparison with Wright's data, the constant S_1 and S_2 were found such that at $\lambda = 582.5$ mμ

$$p_r(R)\cdot S_1 = p_g(G)\cdot S_2 \tag{4}$$

and S_3 such that at $\lambda = 494.0$ mμ

$$p_g(G)\cdot S_2 = p_b(B)\cdot S_3 \tag{5}$$

Then the red trichromatic coefficient is

$$r_\lambda = \frac{p_r(R)\cdot S_1}{p_r(R)\cdot S_1 + p_g(G)\cdot S_2 + p_b(B)\cdot S_3} \tag{6}$$

The green coefficient is

$$g_\lambda = \frac{p_g(G)\cdot S_2}{p_r(R)\cdot S_1 + p_g(G)\cdot S_2 + p_b(B)\cdot S_3} \tag{7}$$

and the blue coefficient is

$$b_\lambda = \frac{p_b(B)\cdot S_3}{p_r(R)\cdot S_1 + p_g(G)\cdot S_2 + p_b(B)\cdot S_3} \tag{8}$$

To test the additivity of luminances the data must be converted to luminous units. The values V_{650}, V_{530} and V_{460}, the luminous efficiency of unit energy amount of the primaries, were employed. The equal energy color mixture functions in luminosity units are:

---

[5] The symbol ≡ in equations (2) and (3) reads "matches." It does not denote symmetry. As stated by Stiles and Burch (1959): "One cannot move a quantity through the match symbol without using an auxiliary match . . . ." For treatment of spectral matches in terms of the restricting conditions of this formulation, see Stiles and Burch.

$$V_{\lambda_s} = \frac{V_{650}p_r(R)}{P_\lambda} + \frac{V_{530}p_g(G)}{P_\lambda} + \frac{V_{460}p_b(B)}{P_\lambda} \tag{9}$$

where the terms V_{650} p_r and the two comparable terms on the right side of equation (9) are $\bar{r}$, $\bar{g}$ and $\bar{b}$, respectively, i.e., instrumental color-matching functions referring to the working spectral primaries. V_{λ_s} is synthetic luminosity, the sum of the three right terms in (9) rather than V_λ measured for wavelength bands through the spectrum. If V_λ and V_{λ_s} are equal, within acceptable limits of variability, then the additivity law of luminances cannot be rejected.

For measurements in the color deficient eye, only two primaries were found necessary, so that the (G) term could be omitted from all equations. The dichromatic coefficients in the WDW system were equated at 494 mμ only. S_D was found such that at 494 mμ:

$$p_r(R) \cdot S_D = p_b(B) \tag{10}$$

Then the red dichromatic coefficient is

$$r_\lambda = \frac{p_r(R) \cdot S_D}{p_r(R) \cdot S_D + p_b(B)} \tag{11}$$

and the blue dichromatic coefficient is

$$b_\lambda = \frac{p_b(B)}{p_r(R) \cdot S_D + p_b(B)} \tag{12}$$

In luminosity units, the equal energy color mixture functions are

$$V_{\lambda_s} = \frac{V_{650}p_r(R)}{P_\lambda} + \frac{V_{460}p_b(B)}{P_\lambda} \tag{13}$$

where the values for V_{650} and V_{460} were taken from the mean luminosity curve for the dichromatic eye.

Results. Although our luminous efficiency values by flicker photometry were obtained largely as a step in the production of complete color mixture data, it is of interest to look at the curves for the two eyes in relation to a group of normal observers. In Figure 1 the values for the normal eye, represented by the solid line, have been adjusted to unity at 550 mμ. The data are given in Table 1. The extreme values for a group of six normal observers (Sperling, 1958) by the same technique of measurement and using the identical white light standard are shown by cross-hatching. The dashed curve shows the values for the deficient eye—for the same standard on the

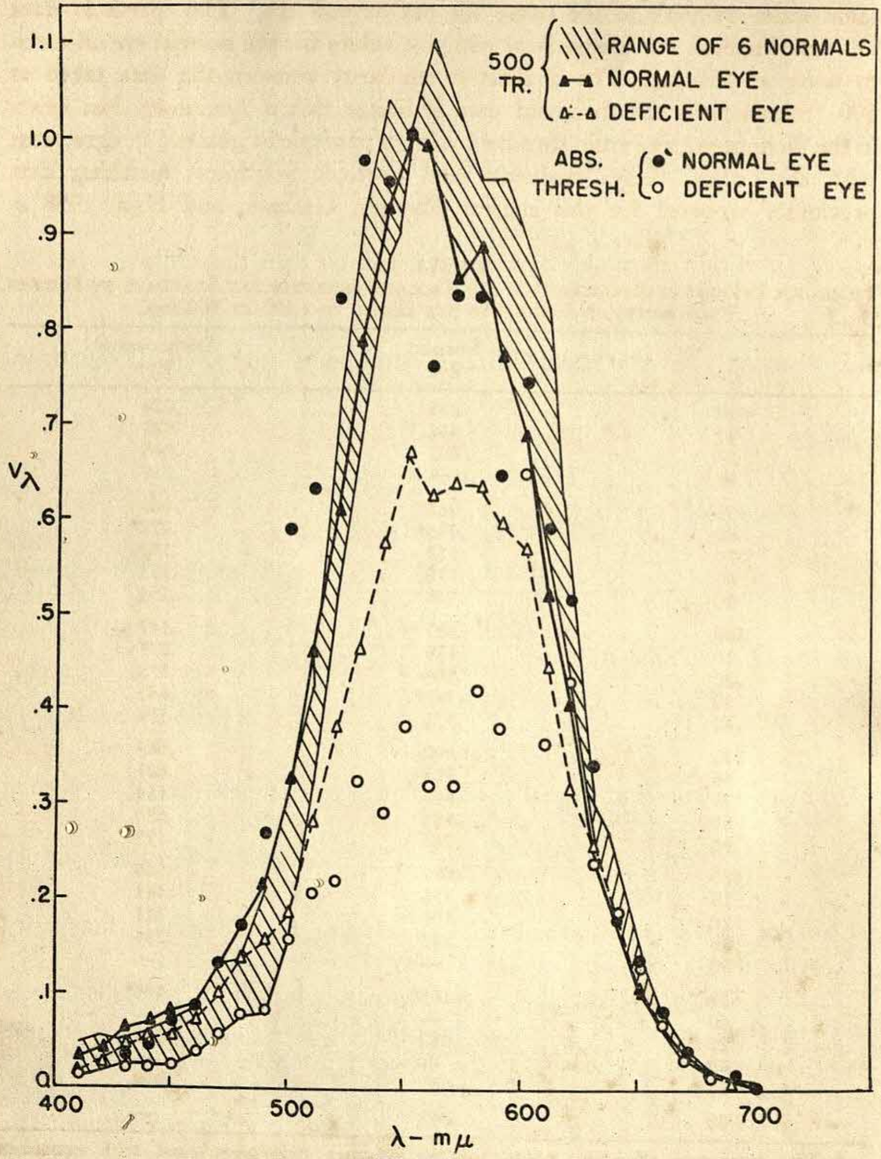

FIGURE 1

High brightness luminosity data for the color deficient (dashed line) and the normal eye (solid line) of our subject as compared with the extreme data of a group of normal subjects (cross-hatching). The previously reported absolute threshold data (Graham and Hsia, 1958a) are superimposed as large circles.

same scale—relative to the curve for the normal eye.[6] The threshold data are superimposed for comparison, with the values for the normal eye adjusted to unity at 550 mμ. The qualitative similarity between the data taken at 500 trolands and the threshold data indicates that a luminosity loss exists in the dichromatic eye from threshold to high photopic brightness, in agreement with the critical flicker frequency and photopic brightness matching data previously reported for this subject (Berger, Graham, and Hsia, 1958 *a,*

TABLE 1
Luminous Efficiency Relative to a 500 Troland Incandescent Standard by Flicker Photometry. Normal Eye Set Equal to 1.000 at 500 mμ.

λ	Normal Eye	Dichromatic Eye
410	.035	.024
20	.042	.028
30	.062	.046
40	.069	.050
450	.083	.053
60	.086*	.072*
70	.132	.100
80	.176	.135
90	.214	.155
500	.317	.187
10	.459	.277
20	.604	.378
30	.780*	.462
40	.921	.574
550	1.000	.667
60	.985	.621
70	.848	.634
80	.883	.630
90	.766	.593
600	.681	.566
10	.516	.441
20	.400	.311
30	.242	.254
40	—	—
650	.103*	.106*
60	—	—
70	.032	.031
80	—	—
90	.007	.004
700	.003	—

* The luminous efficiency values of the mixture primaries used with equations (9) and (13).

---

[6] The value taken for K in equation (1) was the same as that taken for the normal eye.

b). That the curve for our subject's normal eye falls within or very near the limits of our normal observers should be noted.

The color mixture data for the normal eye are shown as trichromatic coefficients in comparison with Wright's for the same primaries at the top of Figure 2. There it will be seen that, except for minor differences, our subject's normal eye gives the same sort of color mixture data as Wright's subject. The lower graph of Figure 2 shows the dichromatic coefficients for our subject's color deficient eye, together with Pitt's mean determinations (1935) for seven deuteranopes with the same pair of primaries.[7] We employed two techniques in the violet, as described above. The data obtained by Pitt's technique of presenting red on the standard side for desaturation are presented as large open circles. The general shape of the functions including these data is similar to Pitt's mean curves, except for the fact that the amounts of the 650 mμ primary used on the two sides of the match field for violet were almost exactly equal; hence, no negative values resulted. The data are given in Table 2.

Our subject can match spectral violet (without desaturation) with a combination of the 460 and 650 mμ primaries. This result is shown by the curves of Figure 2. Based on equal quantities at 494 mμ, the curves recross in the violet between 420 and 425 mμ. This result is strikingly different from Pitt's. It cannot be doubted, however, since it was found in separate measurements on different apparatus at both Columbia University and New London. It must be remembered that the 494 mμ crossing point was arbitrarily chosen. It might have been better to fix the crossover at our subject's neutral point and then examine the curves in the violet. We have examined our data in this way, setting the crossing at 504 mμ. Under the circumstances the recrossing in the violet does not occur and it becomes clear that any crossing point above 500 mμ will eliminate recrossing at such wavelengths as have sufficient energy to be seen in the violet. Nevertheless, the dichromatic coefficient curves still approach each other and might be expected to recross in the far violet or near ultraviolet if data for those wavelengths could be obtained.

The trichromatic and dichromatic coefficients reflect only the proportions of the primaries required to match the spectrum. The quantities have been removed by forming the ratios in Equations 6, 7, 8. The actual quantities in energy units are described in Equations 2, and 3, and in luminous units in Equation 9. No use has been made of these quantities in the past, in connection

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[7] Small errors that applied in earlier versions of the lower graph of Figure 2 (Graham and Hsia, 1958d, e, f, g, h) at 500 and 510 mμ are here corrected.

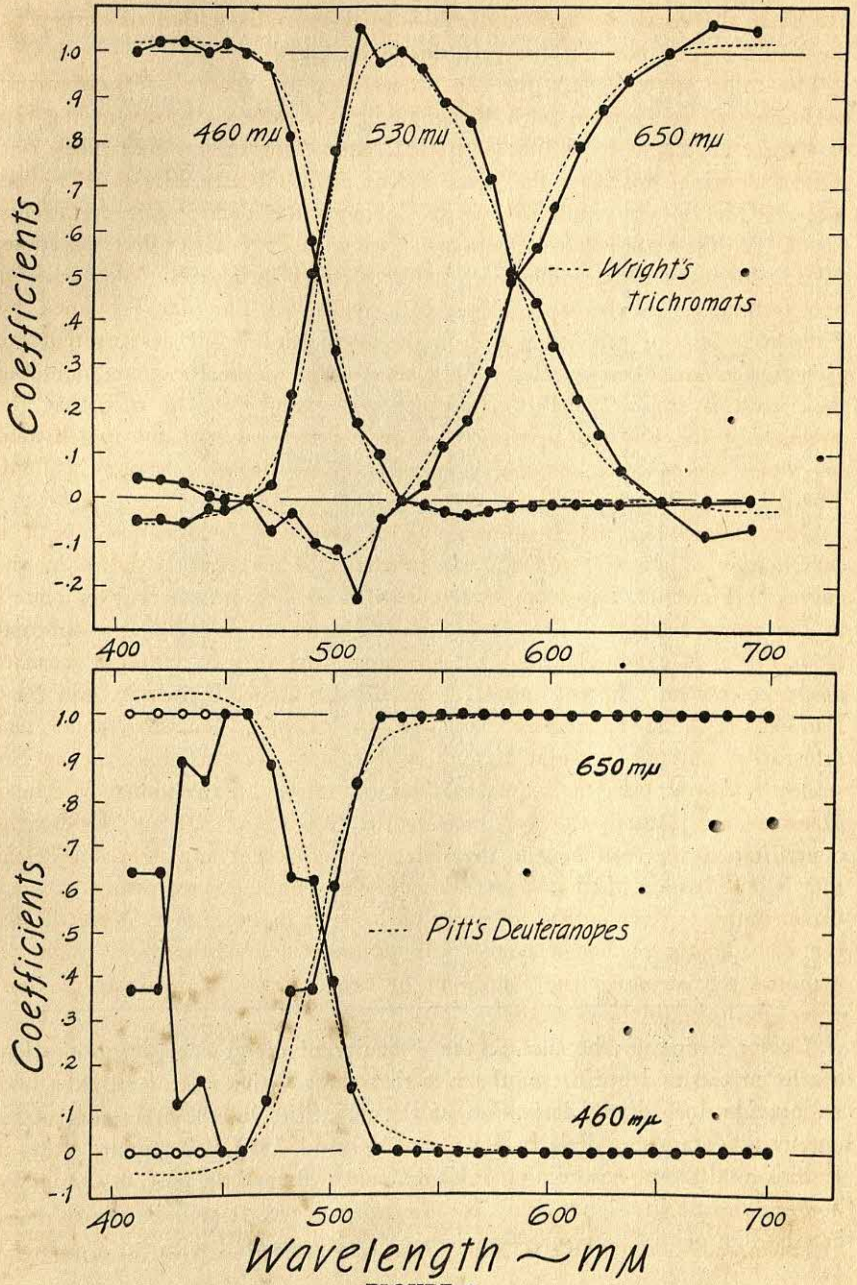

FIGURE 2

(*a*) The trichromatic coefficients (solid lines) for our subject's normal eye compared with the mean of Wright's (1947) normal trichromats (dotted lines).

(*b*) The dichromatic coefficients (solid line or large open circles) for our subject's color deficient eye compared with Pitt's (1935) average deuteranope (dotted line). In both curves the units have been equated at 494 mμ.

TABLE 2
COEFFICIENTS IN THE WDW SYSTEM FOR THE DICHROMATIC AND TRICHROMATIC EYES OF A UNILATERAL DICHROMAT

λ	Dichromatic coefficients r_{650}	b_{460}	Trichromatic coefficients r_{650}	g_{530}	b_{460}
410	.634	.366	.038	—.046	1.007
20	.636	.364	.028	—.044	1.016
30	.111	.889	.021	—.049	1.027
40	.153	.847	.009	—.020	1.011
50	.000	1.000	.009	—.025	1.017
60	.000	1.000	.000	.000	1.000
70	.120	.880	—.007	.030	.977
80	.367	.633	—.047	.232	.815
90	.383	.617	—.099	.501	.598
500	.608	.392	—.115	.781	.334
10	.848	.152	—.230	1.061	.170
20	.998	.002	—.077	.977	.100
30	.995	.005	.000	1.000	.000
40	.997	.003	.050	.960	—.010
50	1.000	.000	.122	.895	—.016
60	1.000	.000	.176	.846	—.021
70	1.000	.000	.291	.722	—.013
80	1.000	.000	.500	.510	—.010
90	1.000	.000	.571	.440	—.010
600	1.000	.000	.670	.341	—.011
10	1.000	.000	.791	.219	—.011
20	1.000	.000	.872	.140	—.011
30	1.000	.000	.934	.077	—.011
40	1.000	.000	—	—	—
50	1.000	.000	1.000	.000	.000
60	1.000	.000	—	—	—
70	1.000	.000	1.089	—.089	.000
80	1.000	.000	—	—	—
90	1.000	.000	1.073	—.073	.000
700	1.000	.000	—	—	—
Coefficients Determined by Pitt Technique of Adding Red to Both Lights During Matching					
410	.000	1.000			
20	.000	1.000			
30	.000	1.000			
40	.000	1.000			

with color deficiency, because of the difficulty of direct energy specification in colorimeters and because of the idea that the additivity law of luminances can provide an indirect derivation of the quantities by the fractionation of luminosity data (see Wright, 1947, pp 140 and 331). The mixture data, as derived directly according to Equations 2, 3, and 9, are shown on a luminosity scale in Figure 3(*a*) for the normal eye. It will be noted there that the sum of these mixture functions (V_{λ_s}) agrees well with the separately determined V_λ, as has previously been shown by Sperling (1958) for normal vision when flicker photometry is used. Figure 3(*b*) gives the mixture functions for the color deficient eye in luminosity units. The data for both eyes are given in Table 3. Two points of possible significance arise from the data viewed in this fashion: (*a*) when the crossing of the *R* and *G* curves is determined by the observer in actual quantities, it occurs above above 500 mμ in agreement with the main minimum of our subject's hue discrimination curve, and (*b*) in the region of the crossover and the yellow and orange regions, where the sum of the *R* and *B* functions should agree

TABLE 3

Color matching values, $\bar{r}$, $\bar{g}$ and $\bar{b}$, for the equal energy spectrum. These quantities were employed to produce trichromatic and dichromatic coefficients according to equations (4) — (8) and (11) — (12). Luminous units were obtained from them according to equations (9) and (13).

	Normal eye			Deficient eye	
λ	$\bar{r}$	$\bar{g}$	$\bar{b}$	$\bar{r}$	$\bar{b}$
410	.233	—.037	.407	.010	.142
20	.408	—.087	.988	.012	.495
30	.262	—.082	.849	.010	.580
40	.097	—.029	.767	.016	.635
450	.126	—.051	1.023	.000	.787
60	.000	.000	1.000	.000	1.000
70	—.116	.000	1.128	.022	1.161
80	—.388	.260	.453	.158	1.945
90	—.544	.377	.221	.208	2.403
500	—.670	.612	.116	.566	2.569
10	—1.282	.797	.058	1.923	2.406
20	—.650	1.092	.035	3.198	.048
30	.000	1.000	.000	4.744	.152
40	.495	1.259	.000	4.702	.076
550	1.184	1.154	.000	5.322	.015
60	1.699	1.115	.000	6.116	.192
70	2.058	.688	.000	6.423	.056
80	4.427	.617	.000	4.835	—
90	4.136	.459	.000	5.655	.011
600	4.184	.291	.000	6.042	.004
10	4.010	.151	.000	5.215	—
20	3.262	.072	.000	3.018	.002
30	2.155	.024	.000	2.265	.005
40	—	—	—	—	—
650	1.000	.000	.000	1.000	.000
60	—	—	—	—	—
70	.262	—.003	.000	.287	.001
80	—	—	—	—	—
90	.068	—.001	.000	.606	.000

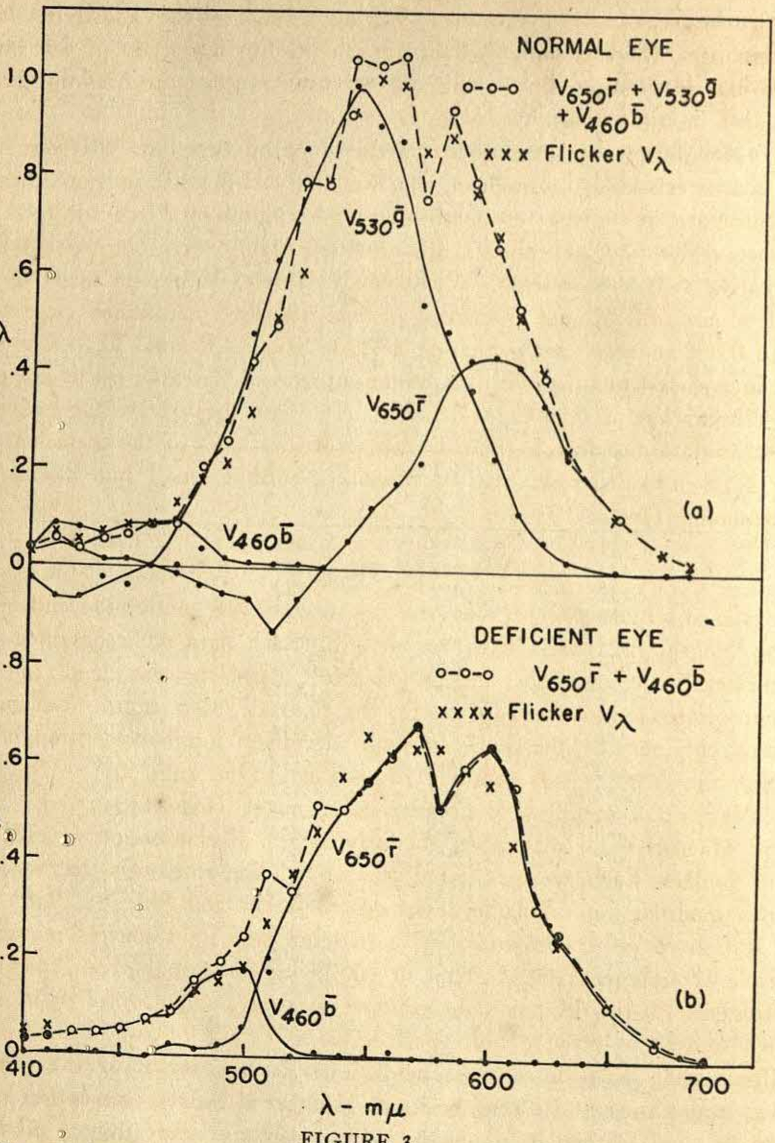

FIGURE 3

(*a*) The equal energy color mixture functions in luminosity units for our subject's normal eye.

(*b*) The equal energy color mixture functions in luminosity units for the color deficient eye.

with the separately determined V_λ, according to the additivity law of luminances, there is some lack of agreement. Further study of this question and the interesting dip in the red mixture function at 580 mμ is being studied in dichromats by Sperling.

In conclusion, we may say from the color mixture data that our subject is characteristically normal in one eye and dichromatic in the other. The dichromatic eye gives results that are not typical of Pitt's subjects in the violet region, but when data are obtained that involve the presentation of negative red, they resemble Pitt's fairly closely. When no negative red is introduced, the *R* and *B* curves, instead of being maintained close to 1.00 and 0.00, approach each other at a value below 450 mμ. This result might be interpreted to agree with the minimum in the blue exhibited by wavelength discrimination in the color-deficient eye (see the section on wavelength discrimination), since a great difference in the slopes of the coefficient curves at a given wavelength may be associated with a small hue discrimination threshold (Hecht, 1930).

C. WAVELENGTH DISCRIMINATION

Hue discrimination curves show how the just noticeable difference in wavelength, $\Delta\lambda$, varies with wavelength. Such data were obtained on our unilaterally color-blind subject. Careful attention was paid to making appropriate luminance adjustments so that all wavelength discriminations were obtained at the same constant level of luminance throughout the spectrum. A curve was obtained on each eye of our subject.

We used a modified Helmholtz color mixer (manufactured by Schmidt and Haensch) for measuring the wavelength discrimination in each eye of our subject. Each eye was tested separately. The apparatus that we used is, with modifications, the one described by Hecht and Shlaer (1936). It has a stationary dispersion prism, with two tungsten light sources movable in a circle about the prism. Instead of employing the usual arrangement which utilized both the ordinary and extraordinary rays of polarized light from the two sources to provide four spectra, we made use of two beams, each one illuminating half of the test field. The Rochon prism of the instrument was maintained at its zero position. Hecht and Shlaer had earlier modified the original instrument; they introduced, among other things, micrometers for the accurate control of the movement of the light sources. They also added a white light beam for neutral point determinations. Other details of the apparatus can be found in their article (1936). We rearranged the light sources by substituting new lamps with single compact vertical coils

(G. E., 4A, 8.5 V) for the old; the image of each lamp, when condensed, covered the entrance slit. (The resulting visual fields appeared to be quite uniform in luminance. We did not use the diffusers of the earlier instrument and thereby gained additional luminance.) In order to extend the eye-piece into a dark chamber we added two lenses beyond the exit slit to form a condensing system for Maxwellian view. As a result of these changes, the beam from the right source now fell on the right half of the field, and the beam from the left source, on the left.

Although we varied the entrance slit to furnish a band-width of 5 mμ, we were unable to vary the exit slit. We cannot therefore claim that our band-width was constant. It was instead 9 mμ at 500 mμ and 14 mμ at 600 mμ for the full band. We must also add that our apparatus was not quite free from internal stray light in spite of the fact that we added some baffles. The influence of the stray light was reduced greatly in one set of determinations on the normal eye by our use of a "blocking" filter, Corning filter 4010, which passes wavelengths in the middle range of the spectrum but absorbs stray light coming from the extremes of the spectrum.

The whole bipartite field was round, 72 minutes in diameter, and with a dark separation between fields along the vertical diameter about 10 minutes wide. One half of the field served as the standard and the other as the comparison in half the series. In the other half, the fields were reversed.

Prior to wavelength discrimination determinations the luminances of the wavelengths throughout the spectrum for the standard field were equated by the cascade method for each of the subject's two eyes. Under these circumstances the discriminations done at the constant level of luminance, determined by the luminance matches, was about three millilambents seen through an artificial pupil 4.2 minutes in diameter, i.e., about 132 trolands (uncorrected for Stiles-Crawford effect).

At the beginning of each series of determinations the experimenter introduced similar wavelength distributions in the two fields. The subject turned a knob to adjust the wavelength of the comparison area to match the color of the standard field. The experimenter then increased the wavelength of the comparison field in equal successive steps of about 5 mμ until the subject could no longer match the standard color. The criterion for terminating the series was three consecutive "different" responses, the first of which was taken to be the point of change in response and therefore the point of just perceptible difference in wavelength. At that point the wavelength of the comparison area minus the wavelength of the standard gives the just discriminable wavelength difference Δλ. As a matter of convenience, we determined this value always as an *increment* in wavelength.

We determined the just discriminable wavelength difference at every 10 mμ interval from 400 mμ to 690 mμ for the normal eye and to 670 mμ for the color-blind eye of our subject. At each wavelength position determinations were made in three threshold series at one sitting and then repeated at another. Following this procedure, the standard and the comparison areas were changed in position and the determinations were repeated two more times. The final averages, presented in Table 4, represent 12 individual determinations for each wavelength. The interchanging of standard and comparison areas of the results did not bring out any systematic difference in discrimination.

TABLE 4
JUST DISCRIMINABLE WAVELENGTH DIFFERENCES OF A UNILATERALLY COLOR-BLIND SUBJECT. EACH VALUE IS AN AVERAGE OF 12 INDIVIDUAL DETERMINATIONS.

Wavelength (λ in mμ)	Just discriminable wavelength differences ($\Delta\lambda$ in mμ) Normal Eye Filter C4010	Normal Eye No filter	Dichromatic Eye
400		2.85	6.00
10		1.87	5.10
20		1.28	3.82
30		1.00	5.32
40		1.40	8.30
50		1.80	16.00
60		1.38	17.50
70		1.27	11.60
80		1.05	8.80
90	.95	1.56	6.35
500	.85	1.25	3.45
10	.95	1.20	4.60
20	.88	1.20	7.30
30	.95	1.20	11.90
40	1.25	1.19	13.80
50	1.38	1.70	17.90
60	1.08	1.25	19.10
70	1.20	1.41	22.50
80	.98	1.05	24.68
90	1.13	1.32	26.30
600		1.39	27.45
10		1.60	25.65
20		2.30	35.35
30		2.28	26.95
40		2.25	25.20
50		2.75	23.00
60		2.75	15.25
70		2.65	35.40
80		2.75	
90		3.65	

In the series on the normal eye with the Corning filter 4010, the procedure used was similar to that employed when no filter was present. The luminances of adjacent wavelength bands seen in the presence of the filter were equated successively to each other by the cascade method, beginning with unfiltered light at the established level for the series not involving a filter. The Δλ values determined under these conditions are shown in Table 4. They are, for some reason (improved discrimination in later series?), smaller than the values obtained without the filter, but, in general, they show that our conclusions on Δλ for the normal eye probably need not be greatly influenced by considerations of light scatter from the spectral extremes.

The just discriminable wavelength differences, Δλ, through the spectrum are plotted against the wavelength, Δλ, in Figure 4. In general, the curve for the normal eye in Figure 4 does not seem to be greatly different from the usual hue discrimination curve obtained on normal individuals (Wright, 1947). The poorest discrimination, as shown by the largest Δλ, takes place in the red. Minima occur in the middle range of wavelengths; our subject shows especially low thresholds in this range. It is quite clear that the normal eye of our subject does not show defective wavelength discrimination.

The difference between the curve for the normal eye and that for the color-blind eye is obvious. The middle portion of the curve for our subject's dichromatic eye is similar to the wavelength discrimination curve for the deuteranope found in the literature (e.g., Pitt, 1935; Hecht and Shlaer, 1936). It is V-shaped, with the tip of the V hitting almost exactly on the neutral point of this eye. The neutral point is near 502 mμ as determined by a match against the white of the instrument which has a color temperature of 5000° K. The two ends of the wavelength discrimination curve have an appearance quite different from the classical picture for deuteranopes. [It is also different from the wavelength discrimination curves of the deuteranomalous cases of Nelson's (1938), where in no instance was there a minimum in the blue.] In the violet the curve shows somewhat heightened thresholds for wavelength change, but near 450 mμ it shows a great rise in Δλ, thus indicating very poor hue discrimination. Discrimination improves to a minimum threshold value near 500 mμ, in the region of the neutral point; thereafter Δλ rises to very high values near 600 mμ. The behavior of hue discrimination in the spectral region from 500 to 750 mμ is similar to that found in the usual deuteranope (Pitt, 1935; Wright, 1947).

Recent work by Balaraman, Hsia, and Graham (in preparation) found no deuteranope or protanope with a branch in the blue like that of our

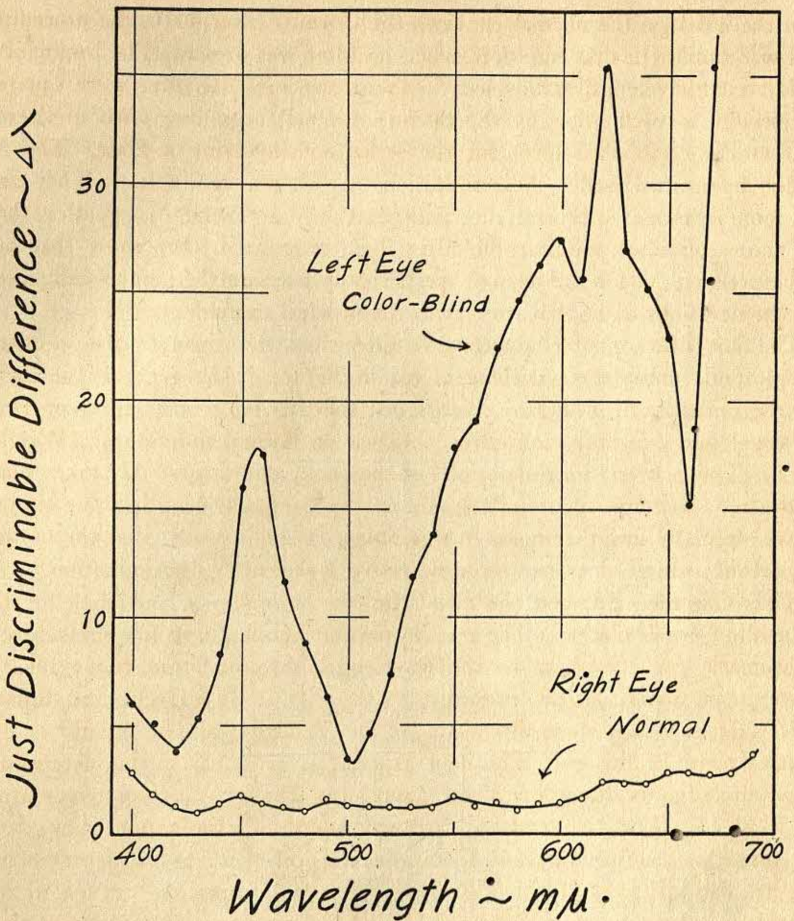

FIGURE 4
The just discriminable difference Δλ plotted against λ for the dichromatic eye (upper curve) and normal eye (lower curve).

unilaterally color-blind subject. On the other hand, some deuteranopes showed high (rather than indeterminate) values in the red, a fact that is somewhat reminiscent of the data given by our subject's dichromatic eye.

D. Binocular Color Matches

In this experiment the subject regarded the color given by a narrow wavelength band in her dichromatic eye and simultaneously observed another monochromatic and seemingly adjacent color that appeared, in the binocular field, to match the stimulus for the dichromatic eye. By turning a knob the subject could change the wavelengths stimulating the normal right eye until a monochromatic band was obtained that matched the color seen by the dichromatic eye.

The apparatus used was essentially a mirror stereoscope with a Bausch and Lomb graduated interference filter in the beam to each eye. The bands, in the absence of an auxiliary "blocking" filter, had the following representative widths for a slit 0.5 mm in width: approximately 10 mμ at 445 mμ, 20 mμ at 570 mμ and 30 mμ at 625 mμ viewed through the completely opened slit of the spectrometer. Wavelengths determined by this method were found to be linear with scale reading. A diagram of the apparatus is shown in Figure 5. The subject regarded the slits lying just in front of the variable interference filters through eye-piece tubes at a distance of 40 cm. The left slit constituted stimulus for the dichromatic eye on the left; it was a narrow vertical line, 18 by 0.5 mm, lighted by a selected wavelength band. Beside it and at right angles to it another comparable line (the stimulus for the trichromatic eye) appeared with the color given by the wavelength band selected by the subject. Depending upon the phorias of different individuals, the two lines may appear to be close to each other at the end of one and

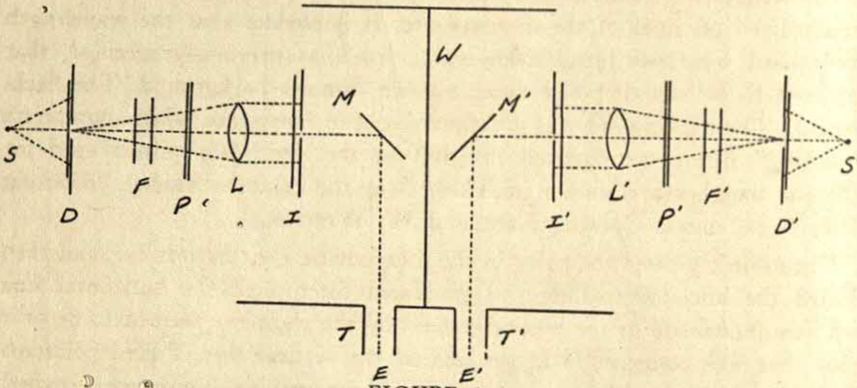

FIGURE 5

Diagram of the apparatus used for binocular color matches. *S*, light source; *D*, diffusion glass; *F*, neutral and "blocking" filters; *P*, paired polaroids; *L*, collimating lens; *I*, variable interference filter; *M*, mirror; *W*, partition; *T*, viewing tube; *E*, position of eye.

The above symbols refer to the left eye. The primed symbols apply to the similar component for the right eye.

the bottom of another, at the end of one and the middle of the other, or in fact, they may intersect. Originally it had been thought that it would be best to have them intersect, the center of each one being blacked out in such a way that the point of intersection would be on a "fused" point which would serve for fixation purposed. However, it turned out that our subject made good matches without any such special arrangement and so she was allowed to match the colors of the lines where they happened to fall in the binocular field.

Observations took place in the dark room that was just faintly illuminated by unscreened dim, ambient light. No special attention was made to screen all the stray light from the subject's environment; it was deemed sufficiently screened if it did not mix with the monochromatic light coming through the interference filters or appear in the dark background near the slits.

The wedges were calibrated by means of a Bausch and Lomb spectrometer, standardized on lines of the mercury arc. It is obvious that the wavelength bands used were not lines. Each was a band, as previously specified, that appeared to be superimposed upon a much dimmer background. The background. The background was greatly reduced in luminance when appropriate "blocking" filters were placed in front of the slits.[8] The filters used for different matches are shown in Table 5 in the columns headed "Blocking Filter." (C means Corning filter, and W, Wratten.).

The subject viewed the color in the dichromatic eye, the left eye, and then rotated the knob controlling the graduated filter until the horizontal line seen simultaneously in the binocular field by the right eye seemed to be of a color that was comparable to the one in the vertical line. Paired polaroids in the beam for each eye provided means for making luminance matches. Of course, the luminance level at which the individual matches were made under these circumstances varied depending on wavelength and the absorption characteristic of the "blocking" filters.

The results of the experiment are shown in Figure 6 and Table 5. In general, it seems that the subject matches all of the wavelengths from 516 mμ and longer to the extreme red in the dichromatic eye by wavelengths in the trichromatic eye near 565 mμ. In a word, wavelengths 516 mμ and longer seen in the dichromatic eye appeared comparable to a yellow in the normal eye. The neutral point for the dichromatic eye was found to be at

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[8] That is a filter chosen to transmit desired wavelengths and to absorb ("block") others.

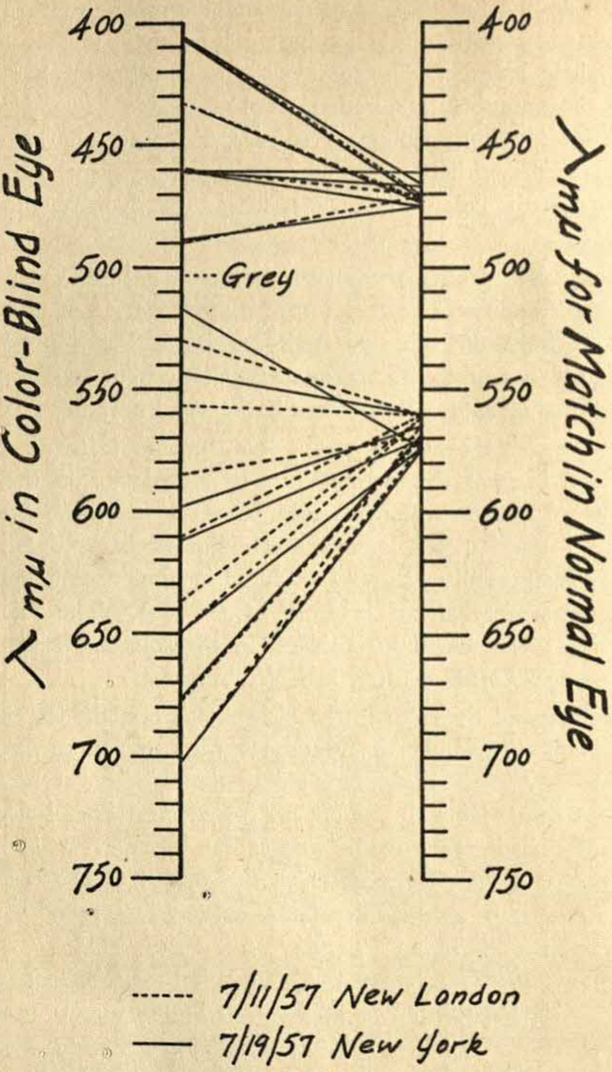

FIGURE 6
Color matches in the normal eye (right scale) for stimuli in the dichromatic eye (left scale).

TABLE 5

BINOCULAR COLOR MATCHES

A wavelength is presented to the subject's dichromatic eye and matched by a selected wavelength in the normal eye.

	Color-blind eye		Normal eye			Color-blind eye		Normal eye	
Date	Blocking filter	λ (mμ)	Blocking filter	Matching λ (mμ)	Date	Blocking filter	λ (mμ)	Blocking filter	Matching λ (mμ)
7/19/57		516		573	7/11/57	C3486	611	C4305	560
	W71A	650	C3486	574		C3486	611	C3486	560
	C3486	611	C3486	574		C4305	489	C4305	472
	C3486	544	C3486	560		C4305	503	C4305	grey
	C3486	678	C3486	565		C4305	557	C4305	560
	W71A	678	C3486	574		C4305	461	C4305	470
	C3486	598	C3486	565		C3486	650	C4305	560
	W70	703	C3486	575		C3486	530	C3486	560
	C3486	703	C3486	575		W71A	637	C4305	562
	W47	489	W48	472		C4305	406	C4305	470
	W75	461	W48	475		W70	703	C4305	573
	W47	461	W48	472		C3486	585	C4305	570
	W75	461	W75	461		C4305	434	C4305	473
	W75	434	W75	471		W71A	678	C4305	570
	C5113	434	C5850	475		W70	703	C4305	563
	W76	406	C4305	462					
	W76	406	C4305	465					
	C5113	406	C5850	472					

503 mμ on the graduated interference filter; the neutral gray could not of course be matched by the trichromatic eye. Wavelengths 489 mμ and shorter were matched in the normal eye by wavelengths near 470 mμ. In a word, all of the short wavelengths appeared to be a blue of about 470 mμ in the trichromatic eye.[9]

E. Color Naming

It is of considerable interest to examine the names that our subject applies to the colors seen by her dichromatic eye. The colors seen in her normal eye are called by their usual names. It will be shown that she can name the colors seen in her dichromatic eye in terms of the color nomenclature that applies to her normal eye.

In these experiments the subject was instructed in some series to look with her normal eye at the field presented in the Fry colorimeter and in the other series, with her dichromatic eye. She was instructed that, on looking at the field, she was to name its color in terms of the simple hue-names red, orange, yellow, green, blue, violet or such simple combinations thereof as yellow-green, blue-green, etc. Additional descriptions involving the concept of saturation, etc., were allowable, but not necessary.

The color names that the subject gave are shown in Table 6 together with descriptive terms, if any. It will be observed that, with her normal (right) eye she gave the generally accepted names for the various wavelengths, sometimes with modifying statements concerning saturation. For the dichromatic eye the names were restricted to yellow, blue, and gray near the neutral point, the latter sometimes described as tinged with yellow or blue. These results are in line with the data on binocular color-matching. Our subject sees in her dichromatic eye only blue below her neutral point and yellow above her neutral point with, it is true, varying degrees of saturation. She can describe the colors seen in her dichromatic eye in terms of the color names she uses for her normal eye.

F. Discussion

Earlier reports (Graham and Hsia, 1958a; Berger, Graham and Hsia, 1958a, b) on the dichromatic vision of our unilaterally color-blind subject

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[9] It must be understood that the different wavelengths in the dichromatic eye that are matched by blue and yellow in the normal eye are seen in different saturation and luminances. The luminances could be matched by adjustment of the polaroids and other neutral filters, but the intrinsic saturations of the different colors varied. No provision was made for introducing variations in saturation by white light. This step would have been desirable but technically difficult.

TABLE 6

NAMING OF COLORS SEEN IN NORMAL AND DICHROMATIC EYE OF OUR SUBJECT

No.	λ	Eye	
1	540	R	green
*2	560	R	yellow-green
3	610	L	yellow, bright, saturated
4	430	L	blue
5	640	R	red, deep saturated
6	590	R	yellow, yellow-orange
7	480	R	blue, slightly toward blue-green
8	540	L	yellow, small amount grey, slightly desaturated
*9	570	L	yellow
10	630	L	yellow
11	500	R	green; blue-green
12	440	L	blue
13	700	L	yellow
14	420	R	violet, very good violet
17	420	L	blue, a little greyish
18	670	L	yellow
19	570	R	yellow, slightly yellow-green
*20	550	L	yellow, slightly desaturated
21	690	R	red, very saturated deep red
22	450	L	blue
*23	470	R	blue, slightly on green side of best blue
24	690	L	yellow
*25	660	L	yellow, deeper and darker than preceding
28	580	L	yellow
*29	600	R	orange
32	560	L	desaturated yellow
33	510	R	green, blue side of best green
34	650	L	yellow
36	610	R	orange, red-orange
37	460	L	blue
38	600	L	yellow
39	700	R	red, saturated
40	430	R	blue-violet, more blue
41	660	R	red, good red
42	470	L	blue
43	550	R	green, yellow-green
45	450	R	blue
46	620	L	yellow
47	500	L	yellowish-grey
48	650	R	saturated red
49	520	L	yellow
51	640	L	yellow
*52	670	R	red
54	620	R	red-orange
56	440	R	violet-blue
57	520	R	green, slightly yellowish
60	590	L	yellow
61	490	R	blue-green

TABLE 6 (*continued*)

No.	λ	Eye	
62	410	R	pure, unadulterated violet
63	530	R	green
64	680	L	yellow
*65	630	R	yellowish-red
66	490	L	mostly grey, a little blue
68	580	R	yellow, orange-yellow
69	530	L	yellow
70	460	R	blue
71	680	R	red
72	480	R	blue, large amount grey
73	410	L	blue, a little desaturated
74	510	L	yellow, slightly desaturated

* Care was taken at these determinations to have the indicated stimulus follow the preceding one at the usual time interval. Since little apparatus adjustment was required in these instances, this precaution was necessary.

show that her dichromatic eye evidenced a well-marked luminosity loss over the spectral range from about 400 mμ to 625 mμ. In the red region of the spectrum both of her eyes show comparable luminosity values, but in the green and blue, a marked luminosity loss occurs in the color-blind eye. This result was shown for threshold sensitivity (Graham and Hsia, 1958a) and measurements of critical flicked frequency and binocular brightness matches in various spectral regions (Berger, Graham, and Hsia, 1958a, b).

The data of the present experiments provide a number of important findings. First, the data on color mixture indicate that our subject has normal vision in her trichromatic eye and dichromatic vision in her color-blind eye. The results provide us with a degree of specification and precision of classification that were usually lacking in earlier experiments on unilateral color-blindness. In addition, it was possible in this study to determine directly, for the first time in a color-blind eye, the energy quantities of the primaries required to match both the chromaticness and the luminance of a spectrum of known radiance. In general, the color mixture data on the dichromatic eye seem to be comparable with data obtained on deuteranopes except in the far violet region of the spectrum. In this region the dichromatic coefficient curves (obtained by matching the test light by a mixture of 650 mμ and 460 mμ as primaries) approach each other, a result that is different from Pitt's. When Pitt's method was followed (by mixing a test light with desaturating primaries to be matched with a mixture of two primaries), the data are not greatly different from those obtained by him except for the fact that no desaturating (i.e., negative) primaries need be mixed with a test light.

The wavelength discrimination curve for our subject's normal eye exhibits essentially normal thresholds. The curve for the color-blind eye seems comparable to the curve given by the usual deuteranope except in the violet, where it manifests relatively good discrimination as contrasted with the poor discrimination usually encountered.

An important finding resulted from our experiments on binocular color matching and on color naming. In these experiments it was demonstrated that our subject's color-blind eye sees two hues: blue below the neutral point, which falls at about 502 mμ, and yellow above it. As shown by binocular color matches, the blue the subject sees is equivalent, in a normal eye, to a wavelength of 465 to 470 mμ. The yellow she sees is equivalent to a wavelength of about 570 mμ.

Earlier accounts (Graham and Hsia, 1958b, c, d, e, f) present an hypothesis as to the basis for luminosity loss in our subject and for the seeing of blue and yellow in the spectrum by deuteranopes, and, also, possibly, protanopes.

The hypothesis is based on the idea, similar to an earlier one by Fick (1879) and Leber (1869), that in the deuteranope, the red receptors and the green receptors contain the same photopigment instead of two different ones.[10] In addition, it is assumed that the receptors, now containing identical photopigments, absorb the same wavelengths in a particular way: specifically, in quantities that are in a constant ratio to each other. In consequence of this activity their nervous connections in the brain signal that respective excitations, red by the red fibers and green by the green fibers, in such a way as always to give yellow.

Let it be supposed that in deuteranopia, for example, the *R* fundamental curve in the upper graph of Figure 7 (the presumed sensitivity curve of the *R* receptors) moves toward the short wave part of the spectrum, with of course a change in sensitivity brought about by virtue of the transformed absorption materials. The new curve can be called *R'*. At the same time, the green fundamental curve *G* moves toward the red and becomes *G'*. (The blue fundamental curve *B* represents small values in its region of the spectrum and will be disregarded in what follows. Nor shall we take up the problem of how the subject sees blue in her dichromatic eye for all wavelengths below the neutral point.)

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[10] One might think of the "transformation" system as representing a failure of *R* and *G* receptors to become differentiated from one another during development. In any case, the *R* and *G* receptors are presumed to be similar in so far as absorption goes, but they have different central connections. The result is that red stimulates both the central *R* and *G* systems. On this basis it would be expected that all long wavelengths would be called yellow by the deuteranopic subject.

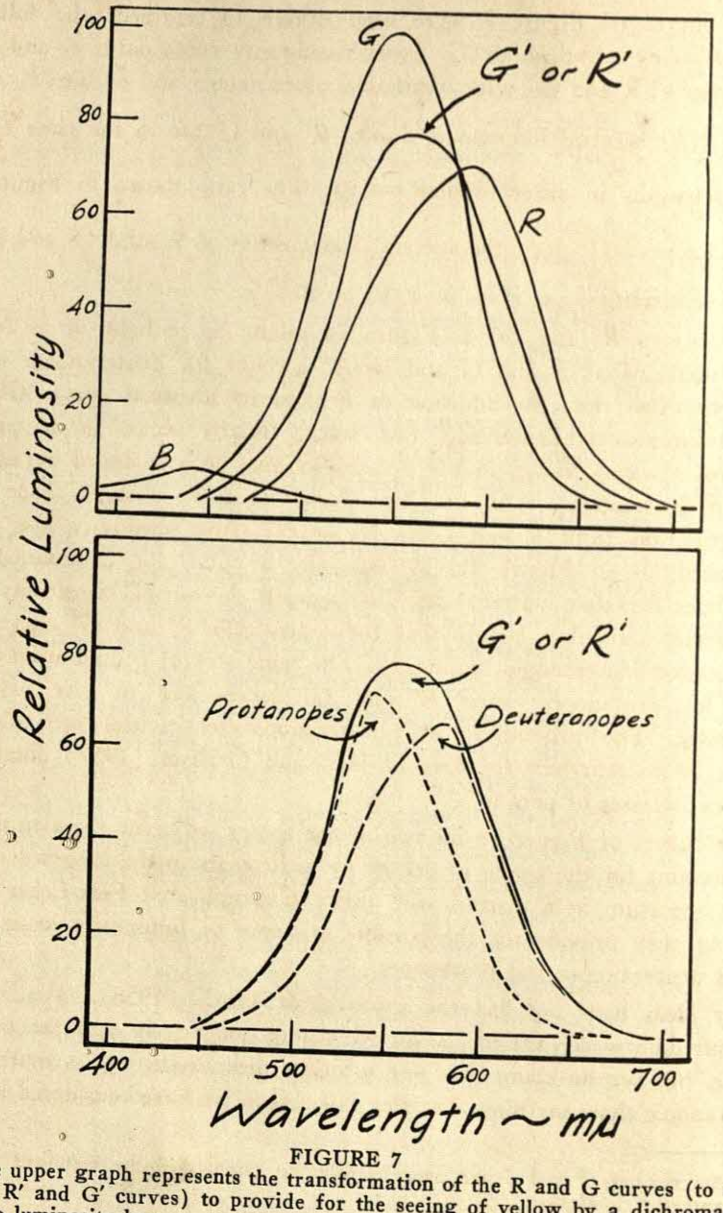

FIGURE 7

a. The upper graph represents the transformation of the R and G curves (to superimposed R′ and G′ curves) to provide for the seeing of yellow by a dichromat who shows no luminosity loss.

b. The lower graph represents the effect, for protanopes and deuteranopes, of luminosity losses.

The curves of Figure 7 have been drawn to represent the following scheme:[11] (*a*) curve R′ or G′ [with luminosity coordinates $\dot{r}'$ and $\dot{g}'$] is an average of R and G (with luminosity coordinates $\dot{r}$ and $\dot{g}$), i.e., $\dot{r}' = \dot{g}' = \frac{\dot{r} + \dot{g}}{2}$; (*b*) spectral luminances due to R′ and G′ are in the same ratio at all wavelengths in order to give yellow. The ratio shown in Figure 7 is unity, i.e., $\frac{\dot{r}'}{\dot{g}'} = 1$; (*c*) the spectral luminosities of R′ and G′ add to give normal sensitivities, i.e., $\dot{r}' + \dot{g}' = V_\lambda = \dot{r} + \dot{g}$.

The curves *R′* and *G′* of Figure 7a might be thought of as limiting transformations of R and G and would account for deuteranopia without luminosity loss; i.e., the addition of *R′* and its identical curve, *G′*, gives normal luminosity. Luminosity loss, which usually occurs in deuteranopes (but not always), must, in the present scheme, be introduced by assuming that, in deuteranopes with loss, the sensitivity curve changes shape in the transformation from *R* and *G* to *R′* or *G′*. Any sensitivity loss can be introduced, as in Figure 7b, by assuming a curve for deuteranopes (or protanopes for that matter) that lies beneath the normal sensitivity curve. Such a curve requires simply that the (identical) *R′* and *G′* curves must sum to give deuteranopic luminosity. The same sort of computation may be made for protanopes; their *R′* and *G′* curves add to give protanopic luminosity. The protanopic and deuteranopic sensitivities are drawn in Figure 7b to represent the data of Hsia and Graham (1957) obtained on these two classes of persons.

The curves of Figure 7b do two of the things we want them to do: (*a*) they account for the seeing of yellow by dichromats in the long wave region of the spectrum in a manner not unlike uncomplicated Fick-Leber theory, and (*b*) they provide for the possible existence of luminosity losses in the eyes of deuteranopes and protanopes.

Our ideas have not had the approval of Walls (1958). Walls argues that our data were obtained on an eye that is not strictly deuteranopic. This is true, but we do claim that our subject's dichromatic eye is more nearly deuteranopic than anything else. For this reason we have considered it useful

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[11] The symbols $\dot{r}$ and $\dot{g}$ are used to refer to symbols in the standard equation for "synthetic" luminosity,

$$V_{\lambda_s} = \bar{r}R + \bar{g}G + \bar{b}B$$

where $\dot{r}$ is $\bar{r}R$ and $\dot{g}$ is $\bar{g}G$. $\bar{b}B$ is zero for the present discussion.

to develop principles based on her case that might apply to this form of color-blindness.

While we are willing to admit that our subject's dichromatic vision differs from that of the usual deuteranopic (her wavelength discrimination is not of the usual type in the blue and violet), we are not willing to accept one of Walls' criteria for rejecting her as a deuteranope: the fact that she shows luminosity loss in spectral green and blue. Walls believes that deuteranopes never show luminosity loss, and he bolsters his opinion by considering Heath's data (1958) on deuteranopic luminosity determined with respect to constant critical flicker frequency. Instead of finding a loss, Heath found a luminosity gain for deuteranopes at medium to high luminances. This result is probably not in line (Graham and Hsia (1960)) with some foveal spectral sensitivity measures at threshold (Hecht and Hsia, 1947; Willmer, 1949; Hsia and Graham, 1957; Zanen, Wibail and Meunier, 1957; Collins, 1959) nor it is in line with Verriest's determinations (1958) of luminosity for different levels of visual acuity in deuteranopic subjects in a large population of color-blind persons. (See also the data obtained by Boynton, Kandel, and Onley (1959) on single dichromats by a rapid chromatic adaptation method.) On extrapolating his data to "cone threshold" (i.e., CFF = 0), Heath reports that his results show losses like those obtained by Hecht and Hsia (1947), a statement that seems unconvincing to the present authors.

It is possible that losses that exist at threshold may not exist at high luminances (although this is not true in the case of luminance matches and probably not flicker for our unilaterally dichromatic subject (Berger, Graham, and Hsia, 1958a, b)). If it should turn out that certain functions showing losses at threshold do not show losses at high levels of luminance, then much analysis and research will be required to clarify the issues raised by this fact.

G. Summary

1. Experiments have been performed on a young woman whose right eye exhibits normal color vision and whose left eye is dichromatic.

2. The normal eye of our subject gives color mixture curves that are similar to those given by normal subjects. In her dichromatic eye, she can match any wavelength in the spectrum with a combination of two primaries, 460 mμ and 650 mμ.

3. The normal eye of our subject does not show defective hue discrimination. Hue discrimination thresholds in her color-blind eye are generally raised above their values in the normal eye. However, in the violet below

440 mμ, her hue discrimination is better than it is in the case of the usual deuteranope.

4. Our subject named the colors that she saw with her dichromatic eye in terms of colors she saw in her normal eye. Wavelengths below the neutral point (which occurs at about 502 mμ) in her color-blind eye are called blue; above the neutral point they are called yellow. At and near the neutral point they are called grey.

5. Data on binocular color-matching support the results of color naming. Our subject's dichromatic eye sees only two colors in the spectrum: a blue equivalent to 470 mμ viewed in her normal eye for wavelengths below the neutral point, and a yellow equivalent to about 565 mμ, for wavelengths above the neutral point.

6. Some data of earlier experiments are discussed. One of these experiments (Graham and Hsia, 1958a) demonstrated that our subject's spectral sensitivity curve shows a loss of luminosity for the dichromatic eye in the green and blue regions of the spectrum. Other experiments, on flicker and brightness matches (Berger, Graham, and Hsia, 1958 a, b), indicate that the loss of luminosity is maintained at relatively high luminances.

7. The seeing of yellow by deuteranopes and protanopes may be accounted for by an idea based on Fick-Leber theory. It is assumed that the characteristic sensitivities of the red and green receptors become similar while no change takes place in their central brain connection. Losses may be introduced into the changed sensitivity curves to specify luminosity deficits.

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LYSERGIC ACID DIETHYLAMIDE (LSD-25): XXXII. RESOLUTION OF COUNTER-IDENTIFICATION CONFLICT OF FATHER DURING OEDIPAL PHASE OF SON*

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A. INTRODUCTION

In previous communications (1, 2, 3, 4, 6) it has been maintained that doses of 25 to 50 mcg of LSD taken orally may produce an elated state (hebesynthesis). Advantage can be taken of this period of elation, which lasts several hours, to deal more effectively with unconscious and preconscious material during psychotherapy. The reconstructive potential and integrative functions of the ego under LSD provide insight into conflict situations not hitherto as readily accessible to the patient.

In this study, LSD was given to a patient, Jack C., 34 years of age, who had had approximately 500 hours of psychoanalysis (7). As a result of his psychoanalysis, he understood many of the mechanisms of his difficulties of adaptation. However, following the birth of a second son, he became uncontrollably irritable with his older son. During many weeks of discussion, no progress was made toward solving this problem. For example, he spoke with great emotion of the "rendezvous" of his older son with his wife when the child "visited" her during the night. LSD had been administered to this patient with success before. It was decided to give him LSD once again in an attempt to reactivate and reconstruct those conflicts responsible for his uncontrollable anger toward his older son.

Because the patient had so many hours of analysis and freely discussed (and interpreted) his feelings from a dynamic point of view, the following verbatim report may be given without much comment at this time. The LSD was administered as described in earlier publications. The details of the procedure will be readily followed from the text.

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B. VERBATIM RECORDING

Dr: This is January 28th, and one hour ago patient Jack C. was given 35 micrograms of LSD.

Pt: The time before last when I had LSD it seemed that I had a marked effect. You said the dosage was a little higher than usual.

Dr: Yes, but it was only 40 micrograms.

Pt: Then the last time I had comparatively less and yet we produced so many great results, I think. It really must be similar to alcohol consumption, for instance, or beer. There are times when you have a cocktail and, you know it's as though you've had nothing. And then there are other times when you can have the same cocktail, and you do get a little giddy or lightheaded or tired or sleepy.

Dr: All drugs, not alone—

Pt: Of course, your chemistry is changing constantly; is that it?

Dr: Of course.

Pt: The chemistry of your body? So your reaction would be different?

Dr: Of course.

Pt: Well, anyway, just within the last, I guess, 10 or 15 minutes, I started to feel, ah, more of a reaction than I remember last time, so that's why I felt perhaps I had a little more, you see?

Dr: No, there is an individual variation.

Pt: Mmm. Well, I want to get right down to business. I have, again, certain daily problems that I am confronted with. And also there's a certain trend in dreams that I've been having; and since the dreams are in sort of a trend, I think they must be very important. For instance, I've had dreams quite a number of times, you know, during the last few years, but I've noticed that in the last week or so, maybe in the last two weeks, I'm not quite sure, there's been an increase in frequency of this type of dream; not necessarily this type of dream, but this symbol, this part of a dream. The dreams contain the images or the picture of elevated structures, like the Third Avenue El or the various elevated subways. And, they're very complex patterns, with overpasses and underpasses and many hundreds of beams and frames and tracks and ties and traffic switches. But strangely enough, never a station. There seem to be a lot of tracks and big girders of steel and tremendous frames, very similar to various elevated lines crisscrossing each other in a very complex way. Another thing I notice is that these frames are always varied. They're not just elevated at the normal height, but they're very high: oh, two to three, maybe four times the normal height of an elevated structure. And they always look very threatening because of their height, threatening because it may all collapse. Ah, that's the feeling; not the threat, not the fear of falling off, because very seldom, if ever, do I have the feeling that I'm on any of the tracks. I'm always underneath, looking way up high into this big maze of girders and stuff. Now this has come up in quite a few dreams, not just the scene itself.

But I'd either be in a subway riding through this, or I'd be walking the street, looking up and seeing one set of tracks turning off the street that I'm walking on through various buildings, and so on. I seem to compare it with a sort of relationship between my emotional setup and analysis.

And, of course, as I have been saying these last few weeks, it almost seemed as though my whole knowledge, my whole knowledge of what I've gained from analysis seems to be poised above me ready to cave in on me; the sort of thing as when the chips are down, as though I haven't really lifted myself above the level at which I was, let's say three or four years ago. Ah, now realistically I know this is nonsense. In many areas, I mean, I can plainly see the advance; I feel it, I live it, etc. And yet I'm sort of frustrated about this inability to muster the aggression, or to get an incentive to forge ahead and start putting a rocket in my behind and get going, you know. Ah, there are times when I get little spasms of it. I figure, well, I'll do this and I'll do that, and then nothing happens. I don't know why, really. I used to find excuses; my family, this, that; but I realize that's a lot of utter nonsense. It's me, and my family provides a very easy, within reach, scapegoat. I'd sure love to work out my feelings toward my son, Don, I'll tell you that. Of course, I think if I could ever do that and track it back properly—I know full well it's not Don—but I, if I could really get to it, I think I could beat a lot of problems down. I remember that for the longest time the mere thought of Don—of course, I could only speak consciously—the thought of him used to bring on a glow, a love, a feeling, a swelling, a wonderful feeling. If I'm to be honest I can only say that these last, oh Christ, I don't know, maybe this last year the feeling changed. And if I'm to be real honest, I would even go back before the recent birth of Herbert. It seems to have been his (Don's) increase of hostility. It almost seems to be that two things happen as a result of analysis. I become a little more honest, perhaps too honest, with some of my feelings, and therefore the hostility breaks out into the open and I can't control it; or the more infantile part of me resents development of Don's intelligence—no, not intelligence, but his ability to function for himself. And in many ways, as we have discussed here, ah, in many ways I am reduced very quickly and very easily to his level. We'd be constantly arguing *at his level;* it was as though he were choosing the weapons, he were choosing the site of battle, etc.

Getting back to dreams, I had an extremely interesting one; I don't remember the dream, I just remember one thing in it. It must have meant a great deal, because it's as clear in my mind now as it was then. And symbolically, it's dynamite.

> "I dreamed that I had an ejaculation: I had sperm coming out of my penis. Now, at the very beginning of that, it's, it was the exciting type of feeling that would, would accompany anything

sexual or the sexual act, and so on. But then the feeling, the sexual feeling, diminished and practically disappeared, but the sperm kept coming and coming and coming, unending. Then it would sort of stop and then continue again, almost as though I were urinating, and you know how it is at the very end, near the end, when you're all through urinating, you always have a few extra drops to get out, and it was the same thing, only it never ended. I would get a few extra out, and then—first I was aware of nothing but the sperm coming out in great force, in great quantity. Then later, sort of gradually, I became aware of the fact that I was just standing over a toilet bowl, you know, as if I were urinating, but it wasn't urine that was coming out; it was sperm. As I said, by that time there was no sexual thoughts or feelings whatsoever; I was just completely perplexed; and I couldn't lose that scene; that scene kept sticking with me for days."

Dr: When did you have this dream?

Pt: I think Saturday night. Of course, I have many thoughts with regard to it; why, you know; try to figure out a few things. And it all ties in with my general, well, to me, loss of power, loss of the ability, or slipping in ability to function as well as I'd like to. To really be more specific, I feel as though I'm letting my—well, symbolically, it's as though I'm letting my manhood get away from me. I can only guess, of course, but I think what has been happening is that the pressures, the threatening pressures, have been from many angles rather than just one, and they all point to this feeling in me. I'm not saying it's proper to have this feeling, ah, or right, and I certainly would like to improve it, but nevertheless, when Don upsets me and we go through our little scenes and my being ineffective with him as a father and as an adult, this is some manhood leaving me.

When I try sometimes to make my wife happy, almost at any price, although it doesn't often get to that, but when it does, I will some times do it just to keep her happy. That, too, is the feeling of the threatening loss of manhood. And then very high up on the list I think would be not being able to get down in the middle of the jungle, which is Manhattan, and the advertising world of the jungle, and stir up some action.

I gave thought to the framework again, and I remember a long time ago having a discussion about coming home from school one day, or rather, going to school. A man had fallen on the tracks of the subway. I was then about 13, and this man was run over by the subway, completely mangled. And very visible was the flesh, parts of the body hanging from the tracks, and the blood was all over the street, and I'll never forget the horrible sight of this cat licking the blood, this I'll never forget! This was about 12:30 in the afternoon, of a very sunny day; Christ, right there on ——— Avenue on the IRT train! Now at ——— Avenue, the IRT train at that point is the highest point in its elevation. And it's raised at such a height to go over the BMT tracks, which is the ——— Avenue station of the ——— Line. And the words "IRT," "BMT" all represent my whole life from the age of 11 until—oh gosh, I'd say until around just several years ago; certainly all of my adolescence. And I think when I get right down to it, that's all my life has been; everything stayed at the adolescent level. A lot of my emotional feelings stayed at the adolescent level. I think in that lies my biggest, or has laid my biggest problems—have lain (chuckle). Oh, yes, and I've given much thought to our discussion during my last visit here where in the dream the man was shouting in the street, and my son asked me, "How come he doesn't get laryngitis?" and I explained to him, "Well, he's trained to do it that way, but as soon as microphones and everything come into being, he'll be out of a job." And I remembered giving a great deal of thought to all these years, I would say, of your constantly being after me to get training in writing and art or whatever, and my fighting you on this consistently. And I remember saying, although I wasn't completely sold on how much it would affect my work one way or the other—I do have to admit that there's some kind of a change going on along those lines anyway. And maybe this, too, is giving up some of my—I'm speaking in sort of a satirical way—giving up a very strong feeling and therefore another piece of manhood going out, being taken from me, being lost.

Dr: I don't understand.

Pt: Well, it's not sensible; it's not a realistic feeling.

Dr: You mean the adolescent equivalent of manhood? You just said, "All my life I've really been adolescent; that has been my biggest problem." Then you said, "For years you've been trying to persuade me to get trained for my profession, and I recently began to see that your point of view might have some virtue in it." And then you said, "The fact that I've given in to you is the equivalent of ineffectiveness with my son, Don; feeling humiliated if I must keep my wife happy at any price and my inability to get down to the advertising business jungle." And you make giving in to me to get training the equivalent of these three items.

Pt: Yes. I mean—when you sum it up that way, I cannot deny that it's definitely in that whole category, yes.

Dr: Now, talk about it. Are you giving in to keep me happy?

Pt: I don't know, I don't know! The more I think of it, the more complex this gets. This becomes very much like those frames and girders and what not, because frames and girders are built very strongly, and yet if you pull away just one girder in the right place, the whole damn thing can come tumbling down. And for some reason or other the thought of that man being run over by that train just keeps coming back again and again. It isn't something I haven't thought of for years; I did bring it up here once at length. We had quite a talk about it and how I thought that the man that was killed was my father. Because I believe it was said that the man that was killed was a mechanic; he had overalls on, and my father was a mechanic at that time. And I remember I cried. I had absolutely no reason at all to suspect that it was my father, but yet I carried on, you know; I got very worried and anxious. I remember how relieved I was, how happy I was to see my father come back home that night.

Now, I can see, having learned a little bit, you know, of the mechanism involved, that perhaps the only real reaction, the only reason for such a violent reaction that was so unrealistic, was that there was an out-and-out wish for my father's death, and, ah, definitely not being able to stand the shock of such a thought, then, carrying on in the reverse. And somewhere in this maze or haze or whatever is a similarity of feelings between that situation and Don and myself. Or maybe I fear that he wishes me dead. Then I identify again very strongly with my father, and so the feeling becomes so damned enmeshed and hard to define and very hard to separate.

Don kept saying something last night that was very upsetting to me. Now, Don has had colds before. As a matter of fact, generally, fortunately, his health has usually been very good. He's had very few colds when other kids had colds every other week. Ah, but when he did get a cold, he was an excellent patient, usually shook it off quite fast, and he never became, you know, never became concerned with it. His nose was stuffed; he tried to clear it, and that was the end of it. Now if his nose is stuffed, he goes into a real, wild frenzy, and last night he said something that was so ridiculous and yet to him it's as real as could be, and that's what made it more upsetting, "Why is it nobody has trouble with his nose like I do? Only my nose is the worst nose there is." And he doesn't want to live; he actually said he does not want to live, in a moment of real anger with his nose and whatnot. My wife and I looked at each other; we said, "My God, what the hell has happened to a five-and-a-half-year-old; he's an old man already to say such a thing." You know, he gets completely irrational when he gets real angry like that. He starts saying all kinds of wacky things. "Aw," he says, "only my nose bothers me. Nobody else has trouble with their nose like this. Gee, I don't want to live with a nose like this." It is only recently, I'd say the last six months, that this kind of thing has happened. If a toy of his breaks, he says, "Oh, only *my* toys break. Nobody else's toys. . . ." He's really beating himself down, and he can only do this if we have made him feel this way; that's all I can say about it.

And I have honestly thought that we have done everything to build him up . . . and I guess in some way we have been banging him down all the way, thinking that we're building. I really have been very—I get very sad. I think the only real sadness I know in my life now is something I wouldn't even admit that I have. Oh, there are things I have to work out all my life, you know, but, there is a sadness in my life, a thing that creates a melancholy, a sadness, a regret that I couldn't have done things differently for Don. When I see the difference between him now and what he was like—again, I'm showing the difference of the passing of time, you know, in self-analysis ability. But still, the look on his face when he was two, two-and-a-half, was such a happy, animated, wide-open, aggressive look; it was just beautiful to behold. And now I guess he's been scarred, he's been hurt and burned, and he's defending himself. It's not there any more, and he's begun to defend himself from these feelings of being beaten, psychologically beaten: he has become rebellious in many areas, just ornery and just happy to create unhappiness, it seems; which I know is ridiculous, because no one is really happy to be unhappy. Nobody wants to be unhappy, yet it seems—

Dr: What is the relationship of this dramatization of certain items with the birth of Herbert, or the anticipated birth of Herbert? Hasn't all of this been enhanced by his brother's arrival?

Pt: Mmm, if I'm to be real honest, I would say no. Now, that might come as a surprise to you, because I think it goes back to even before.

Dr: But you never talked this way before.

Pt: Well, because in many ways we were functioning very well together. And I guess, I wanted only to believe that the good was happening, and I didn't want to see the bad happening. I felt helpless to do anything about the bad happening. You see, all these thoughts, helpless, losing this and that all bring back the sperm symbol thing, as in the dream. But then again, Don is the result of this sperm, so is Herbert, so am I, you know. I mean I could go on and say so is all of, of humanity, but my thought isn't in that way. I said exactly what I meant to say, and that was the thought of Don, Herbert, myself, and my father. . . . And they are the four closest male symbols that I can think of. So I could go on in this vein and say that I always had an inner threat to my masculinity, that I carried with me all the time. You remember, when I first started I had many—I didn't know what the hell they were, but I had feelings of—hidden feelings of homosexuality, which I feared, I did not understand, I didn't even know whether I had or not and . . . It seems that my goal in Don and myself . . . and my father, were the biggest threats to my masculinity within me. Now somehow my brother doesn't come into this. Somehow my brother may come into other things, but I just don't think he comes into this. I never saw it like that, so clearly—Herbert, Don—now I realize even as I say this, that there has been extremely little talk of Herbert. Well, since, you know, I still have the warmest, most wonderful feelings, which even now, as I see him, I still get, because he has such a fantastic disposition. Now Don, at the same age, was also typical of a child of 11 months, playful and so on, but he was not nearly as friendly and as trusting as Herbert is. Herbert is extremely —I mean any stranger, with anybody, he's ready to be friendly. Don was distrustful, but again, I realize that Don was born to two very shaky parents, and Herbert was born to parents, I guess, who are basically still shaky, but at least have a better understanding of where they are shaky. And so Herbert was born to two different parents. Also he was nursed; he was nursed by a mother who wanted to nurse him and who loved to nurse him, and he was nursed up to the age of eight months, which is a hell of a good launching; a good long period.

The framework of all these girders and elevated structures and whatnot not only represent the framework of analysis, because —I remember this building that's right next to us here near your office. I remember coming here every day and seeing a little more and a little more going up until finally it was completed. And you once reminded me of how similar the construction of a new building is to analysis. After a certain phase when the construction takes place, when the framework and then the various floors and then the wiring and the plumbing and the plastering and the electricity is put in, then comes the finishing and the furnishing and the occupation, you know. It was so interesting. Well, the framework is very much like analysis, and at the same time I think, in view of what I've been saying, it indicated the framework of my family.

Something very interesting happened: in 1954, when I was at the Baltimore Advertising Convention, I wrote to you. It was the hayfever season of 1954, and I remember I rambled and raved and I was so jubilant that I was going through this very high pollen season in Baltimore, and every one around me was suffering from all kinds of distress of hayfever and whatnot, and I felt like a million bucks, remember that?

Dr: Yes, oh yes!

Pt: And I remember I hired a typewriter and kept it in my room, and I was knocking out letters to everybody, and I was really having a ball. I love to write letters; I don't know why, I just love to write letters. I love to receive letters, and when I'm at home, I don't have much opportunity to sit down and start writing letters, but away from home I can usually get a typewriter and just sit down and bat out a bunch of letters. *But I* *remember, I wrote my brother a long letter, and then I was going to write to my mother, and believe it or not, I could not recall the address. I couldn't remember—it astounded me that I couldn't remember the address where my mother lived. It was where—it seemed as though for the first time I came face to face with my mother's remarriage. But because of a phase, I think it was the result of a phase, of my analysis, the Oedipus thing, and so on and so forth, this suddenly came very much in focus, especially when I was at Virginia Beach that day, and I saw a middle-aged couple. Remember that?*

Dr: Yes.

Pt: *They were on the beach and acting like lovebirds, you know, and it was so upsetting to me, and it produced almost within minutes a severe asthmatic attack which was the beginning of practically six weeks of asthma and many, many uncomfortable days, emotionally and physically. That was when I could not recall my mother's address. It was fantastic, that time in Baltimore.*

Dr: You didn't tell me this part, did you? This is new, isn't it?

Pt: I think so.

Dr: Yes, I don't recall it at all.

Pt: You mean that I never mentioned to you that I couldn't think of her address. . . .

Don has been doing things, ah, which I hope might help me in trying to understand him. For instance, again he's having difficulty sleeping, which I know indicates a disturbed mind; he's not at peace with himself. Monday started a new career in Don's schooling. Now, I might add, it's ironic that I've begun to think once again of this episode, thinking my father was the man who was killed on the subway. And I began thinking along these lines as of Monday; Monday was the day that Don changed from his afternoon sessions. Beginning Monday, he started his morning sessions. Now I don't know what the hell that has to do with it except that I do so vividly remember that when I saw this death, it was after having come back from lunch, and I was going back to school. And, now Don, who has been going to school after lunch—this is leading me nowhere—is going before lunch.

I begin to wonder if there isn't a possibility that I am, in a sense, wishing myself dead; and then sort of blaming Don for having this thought towards me, as a result of my reflections on the memories of that incident, which I keep saying concerned my father. And in real life it didn't concern my father at all, and yet to me, as vividly as possible, it definitely concerned my father—that man being killed on the subway. . . .

I noticed something new; by new, I mean from whatever I've ever experienced with LSD. Up until now, LSD has always produced an ability within me to be just taken up with whatever

I was discussing, and I would always discuss it in a detached way. In other words, there'd be no feelings connected with what I was saying, at least naturally. I can understand how you'd look back and say, "Oh, there were lots of feelings here and there," and so on, but I would feel nothing consciously. In other words, it would have to be observed by you, but I would feel no feelings consciously, except if I were to find something I had been looking for, there would be a certain feeling of elation, a certain feeling of recognition, of accomplishment. But I noticed today I have a feeling, a real feeling. *I just don't remember having had one before, and unfortunately the feeling is a very sad one. Just now, reflecting upon the . . . this . . . ah . . . this death at the subway station, the thought of my father came back to me and then of his, of actual death, and then just death in general. I suddenly became very preoccupied with death and dying, and I became very, very sad, almost felt like . . . as though I would soon be on the verge of tears; and this is something I've never experienced before. Now I know in the past few weeks, or months, for that matter, I've been on the fringe of a real depression, and I also know that when I go to a movie—*

Dr: Excuse me, you haven't been on the fringe of a depression according to my notes. According to my notes, you only began to feel depressed at the end of a very successful business venture.

Pt: That's what I said: the last few weeks.

Dr: Yes, but it had to do with a change in the business picture in your field.

Pt: But it's showing up in so many ways in my family behavior, you see?

Dr: Yes, but you yourself have pointed out to me explicitly that a change in your position in business would markedly affect—

Pt: Yes.

Dr: This is not something within you; it's something that's affecting you from without.

Pt: Definitely.

Dr: All right. Now that's pretty—

Pt: There should be some strength within me to fortify myself against such a rapid change of behavior. I should have the strength and the courage not to go into a panic, because these past few weeks I have been, if I'm to lay it out bare, I must have been in some kind of panic, from all sides—my work, my position as a father, my position as a husband, etc., etc. We went back to the losing of the masculinity thing and the sperm spilling thing and the whole thing; it is all pretty interwoven there.

Dr: All right, let's stop at this point.

Pt: I just did what I had—I noticed in recent weeks when I go to see a movie and I see a drama of some sort, you know it's almost as though I hope there are sad scenes so that I could cry.

I don't think I've thought that consciously, but now in looking back at that time, it almost seems to be that I wanted to cry; I wanted release.

(*Rest Period*)

Dr: Let's see, now, the time is 2:04 and you had LSD—

Pt: When did we start?

Dr: We started at 1:00 o'clock, and you had LSD at about 12:30.

Pt: You know, it seems like more hours. I just came in and I looked at my watch and I was astounded. I thought it was about three—

Dr: Well, you've been here—

Pt: Well, I know, but I thought I was in discussion, you know.

Dr: You had your LSD at about quarter past twelve or twelve thirty this morning.

Pt: Yes.

Dr: So you've had LSD approximately two hours ago. Well, now, during the pause you went back and listened to the material.

Pt: No, I just—

Dr: Well, you couldn't have listened to all of it.

Pt: No, a bit here, a bit there, and, of course, the word "death" was thrown all over the place, like rose petals, you know, which are associated with death in the Asiatic countries, as I saw Saturday in Cinerama. I've seen all the Cineramas, and this was the most disappointing. And I was doubly let down, because I had heard that this was the greatest of them all. For my money, the first and the third were the best.

Dr: You saw Cinerama Saturday night?

Pt: Saturday afternoon, with Don.

Dr: And Saturday night you had that dream?

Pt: Yes. I was going to get to it because I can see the time. And ironically enough, the name of this latest Cinerama is "Search for Paradise." And not only did I not find paradise, but even the show was disappointing. And this, by the way, is not just my comment; a lot of my friends have seen it and agree that "Seven Wonders of the World," which was the one before this, was excellent.

Dr: Didn't your wife object to your coming to see me recently?

Pt: I let her have it. We had a very good discussion Saturday night, rather Sunday morning, and I sort of let her have it. She says, "I never know when you're angry with me." And I said, "Well, you should know enough by now that you do know when I'm angry with you." And then finally I told her something I have never told her before. I said, "There are times when I get just a little fed up with hearing you say, 'I can't take this any more and I can't take that any more. I can't take this any more and I can't take that any more.' " I said, "For Christ's sake, what have you got that's so tough?" And she just looked at me, you know. I said, "We're not starving." I said, "I'm in a sort of a quandary in regard to my business status, but for crying out loud, there is an income, and the little things you may want, you're holding yourself back from. If you need help in the house, get it, and use it, and take advantage of it." And there was a great mellowing after that. That, by the way, was the morning after I had this dream with the sperm flying all over the place.

Last night I had a dream, and it comes into play right here:

"My wife and I were standing in a subway station, and there was a very old-fashioned—and this thing has come up once or twice before—there was a very old-fashioned airplane, a biplane, that was having trouble. It was falling, the motor was sputtering, and the pilot was desperately trying to bring the plane under control to prevent it from crashing into all the houses, the tenement and apartment houses of this crowded area, which could have been Brooklyn or the Bronx or Manhattan or what have you. And my wife and I both watched this plane, which seemed to be gray, in sort of horror, you know, as we realized that there was a man in that thing, struggling with it to prevent this thing from crashing and to save his life and to save the lives of the people in the buildings. We never did find out the outcome of that plane; it just went out of sight. It crossed diagonally over the subway station, went right from beyond the windows of the subway station and out of sight. And I was very aware of the tail skid."

Know what a tail skid is?

Dr: No, go ahead.

Pt: Remember the old-fashioned planes?

Dr: Oh, yes.

Pt: Under the tail they—

Dr: Two wheels were used and a place to skid on.

Pt: That's right.

Dr: Yes, I remember.

Pt: It's a sort of hook at the very back on which the tail could skid, whereas the newer planes have wheels back there. Of course, the very new planes have the tails elevated entirely, so that the landing gear is a tricycle landing gear. Now, two things come into view along these lines. Yesterday I was working with two friends. They're going back into publicity, and they're formulating a new business based on very old-fashioned ideas; but yet, strangely enough, I think it's going to be commercially very successful. The old-fashioned thing reminded me of my friends, whom my wife and I both agreed acted like a couple of kids. Their enthusiasm for the business is wonderful, but their enthusiasm is such that—well, they get blinded by their enthusiasm to the point where, in many ways, they become unrealistic. The other part that that old-fashioned plane brings to mind is Don, because Don has this fascination for planes and aviation; he's got pictures of all kinds all over his room; in view of how I've been speaking of Don, and how my feelings seem to be going down, down, and we stand by helpless to do anything about it. Last night, when Don went to bed, it was obvious that he was very disturbed again, with this obsession with his nose. He's supposed to go to bed earlier now, because he has to get up earlier than usual. He went to bed about 7:30, but I don't think he fell asleep until about 9:30, and my wife had to rest with him and talk with him and this and that and so on. And I was up writing, and I couldn't function as long as I heard Don talking the way he was. I was very upset; I couldn't concentrate; I was making lots of errors and I had to erase and then rewrite and so on. And finally, once he fell asleep, then I went right through the manuscript, and I worked with greater precision and greater accuracy.

And early this morning—and this happens very often—Don wakes up, and he has to go to the toilet or something. He comes over to our door—and it just so happens he did this just after I went to bed, and that's why I realized what was happening; otherwise, it could have happened a billion times without my knowing it, but my wife has seen him do it, too. He comes over to our door, to the room, on the ground, on his hands and knees, and he sort of peeks around the corner and then he slides—hoping not to be detected by me—he slides on the floor, around the bed, over to my wife's side, for his little rendezvous, so to speak. And then starts to wake her up and annoy her with this and annoy her with that, but in a whisper, only to annoy her, you see, and meanwhile he's keeping me from sleeping. So I always tell him, "Now, get back into bed," and he always says, "There he is, butting in again." He says, "Who's asking you?" And he's been doing this a lot, and Jesus, at those early hours of the morning, it's very hard to have a sense of humor, I'll tell you that. I don't know where the hell this is going to end.

Dr: You just said that you tell your wife that she says, "I can't take this any longer." And you ask her, "What is the beefing about, what's the trouble?" And here, just because Don comes in and talks to your wife, you say, "Where is this going to end?" Aren't you doing just what your wife's doing?

Pt: Mmm. Well, see now—

Dr: Magnifying certain events because—

Pt: It's all there, right there in this spot in particular. It's with Don that I . . . that that expression was said.

Dr: Yes. But you can't handle his hostility; that's quite obvious.

Pt: Just why is he hostile?

Dr: After all of the psychoanalysis that you've gone through, even the material of today, you ask, "Why is he hostile?"

Pt: That, well, I'm not asking because I don't know, but that's what I'd like to work on.

Dr: Oh, it's perfectly natural and normal for him to say to you, "There he is, butting in again." You, yourself, point out that he's having a "rendezvous" with your wife. You, yourself, pointed out the complexity of your own feelings for your father, yet you won't grant your own son the same complexity of feeling. If I may be a bit brutal with you, you want to be the only complex personality in the family.

Pt: Mmm. Almost seems like that, doesn't it?

Dr: Doesn't it?

Pt: Yes. . . . It's almost as though I don't even want my wife to be complex. And Herbert—bless him, he's too young to be complex, so everything is milk and honey with him, you see?

Dr: Now, did you discuss with your wife's friend this problem with Don? Did she have any ideas?

(Jack's wife had been talking over her problems with a close friend.)

Pt: Just vaguely.

Dr: Because she knows you a lot better, your family and the way you live and so on, a lot better than I do.

Pt: Well, she—I know she scared the hell out of Don, I know that.

Dr: Why is that?

Pt: You know, she says "Hi" and he says, "Hi." He hardly has seen her, but he sort of knows her, and you know what I mean? And he has seen her, of course, but not very often, and then after she was there a while, she says—and we were talking about Don—it was time for Don to go to sleep. So, she says, "What's this with you having trouble sleeping? Don't you like to go to bed and have a good night's sleep?" He gave her the funniest look I ever saw him give anyone; he looked at her like—"Hey, what's this?" And then he ignored the question completely, and then just said, "Mommie, put on my pajamas." He's perfectly capable of doing that himself, but when he's in that kind of a state, my wife, of course, always gets him into his pajamas. He tells you when he wants to be babied; he tells you then.

Dr: I wish now that you're under LSD you'd speak freely of why you cannot tolerate Don going through the five-year-old period, the Oedipus situation, and his own difficulty in handling the arrival of Herbert. In all of our discussions, you lend a tremendous amount of material and evidence to indicate that these are the problems. And yet, when it comes to your own feelings, you cannot manage these problems. For example, as you described Don sliding over to your wife to hold the "rendezvous" with her, you spoke rather proudly of his adroitness, but you couldn't handle Don's telling you, "Stay out, old-timer."

Pt: I want to tell you something, honestly. I don't think I would be as annoyed if he were to walk on the other side and just tell her he wants to be near her, or he wants to talk to her, or something, but it seems that he always goes to that side to bother her and to wake her up, to get her to do something, you know.

Dr: Don't you see that he doesn't understand his own feelings?

Pt: Yes, I do understand that.

Dr: Why do you insist on putting the cap and gown of a Ph.D. in Social and Family Psychology on this five-year-old?

Pt: Well, but if it is the love and affection that he wants, he starts off by repelling it.

Dr: Not love and affection that he wants. It's the love and affection of a five-year-old child going through the Oedipus conflict.

Pt: Mmm. In other words, if he has to get attention with anger, which is the way he probably felt he always got it before, he will just go at it that way?

Dr: It will be very complex, and you, yourself, have been through that, through hundreds of hours here, to solve your own problems.

Pt: Maybe all this is reminding me again, or reactivating this whole area.

Dr: Well, it did, in terms of the train station accident.

Pt: Mmm. . . . that network of steel girders is also very reminiscent, as I said before, of the ——— Avenue and ——— Junction Stations, where there's a tremendous network of tracks and girders and steel bridges where these various tracks go into the train yard and different stations and whatnot. I had to pass this every single day when I went to high school. The subway that I took used to pass that all the time when I went to high school, and it's a very high elevation point. . . . so that I can't think of steel beams and girders and subway trains and so on without always, always being brought back to my high school and junior high school years. . . . I know in this dream that I had last night the light was very dim, it was very dull; there was also the feeling of spaghetti, again spaghetti.

Dr: Spaghetti?

Pt: A dream, yes; that joint where I didn't want to—where that actress said that she had to do that Sunday spaghetti show. Remember that?

Dr: Mmm.

Pt: But this wasn't the spaghetti itself.

"I remember something about the spaghetti sauce in the dream last night. And then after being awakened and going back to sleep again, I had this dream about a motor scooter, like there were lots of in Italy. Then there was a fire, not a big fire, but a piece of plastic container of the scooter burned away. And then I remember—I didn't remember this this morning, but I do now. I remember, ah, Betty M. was in the dream again, the girl I keep telling you about. She definitely would fit into that whole period during my 16, 17 years of age. And then, there was this girl that looked like Fred S. Well, she didn't really. Fred S. was the guy I was in the army with. He now lives in Chicago and has five sons, and I see him every time I'm in Chicago."

As soon as I said Fred S. has five sons, I thought back to last year when we visited him: my wife, my daughter Joan, Don and I; and my wife was then in about her seventh month, and his wife was in her seventh month with their fifth child. He had four sons up until that time.

Dr: Would you mind repeating that second sequence of the dream? Is that the whole dream?

Pt: I really don't remember. My mind's very fuddled.

Dr: I see, just a fragment then.

Pt: This morning I didn't remember any of it. Now I'm amazed I can go back this much:

"The thing I do remember very well about last night was that plane coming down. And then, after going to sleep again, awakening, and then going to sleep again, there was this dream about the scooter that caught fire and a plastic container burned up. I just barely remember Betty being in it. She was in a sort of semi-transparent night—not nightgown, but pajamas; not the sexy kind, but just the regular domestic kind they use (laughter). She was standing there—Jesus Christ, she was standing in water; she was standing as on a beach. Her back was to me, and I could see her behind and all, you know, but yet there seemed to be no sexual interest in that. I don't know, I can't explain it; she was just there, you know, with her back toward me, as though looking out towards the sea. And actually, she lives out on Long Island, facing the sea."

Dr: Now, is the girl who looked like Fred in there, too?

Pt: Well, she's the same one, but in true life she doesn't at all.

Dr: Oh, I see.

Pt: Because in the dream I remember I got the two of them together, and I introduced them to each other. I said, "Now, here's the guy." I said, "You look so much alike." You see, I remember that. I said, "I know the two of you won't see it, but I do." Now, Fred S., when I was in Boston, and my wife and I had only been married a short time—her girl friend Dora, the one whose son is an asthmatic. Remember I was telling you about that?

Dr: Go ahead.

Pt: And, ah, she was single then, of course; she was a young girl. She came to visit us in Boston, and she was Fred's date, and we all got a big kick out of the idea that the landlady with whom we lived thought that we were having a big orgy of some sort. What had happened was that Dora had no place to sleep, so she slept with my wife, and I slept in another room with Fred, you see, and it was perfectly legitimate. I don't remember exactly, but the landlady got things mixed up and thought that we were—

that my wife and I were in one room, and that we were putting Fred and Dora up together, and ah, she was a little angry at us the next day. And actually that didn't happen at all. But again, the old proof that people with ugly minds, so to speak, create ugly situations, you know. We've often spoken of that; because it was a big joke. We had a lot of fun that night, and it was all sort of a big party thing.

It's funny; the real complexity of this thing is tremendous. My wife and I were only married at that time maybe two months at the most, and I guess we were having many problems; but boy, we sure as hell didn't know it then. We had a lot of fun then. In other words, it almost seems as though I want to say: if my wife and I could be alone now, with what we have learned, it would really be a different picture entirely. And this, of course, removes the children, which then takes away our whole substance as a family. I always used to think in terms of my wife and me as being the family, and now it's the family as a five-member unit. And I come from a family of a five-member unit, with two sons who are five-and-a-half years apart in age; but for the most part that's quite similar, it's a very similar situation.

I think the big difference—and I can even say this now—between (my son) Don's parents and my parents is that we love each other and are capable of loving each other. I honestly feel that, and I don't think my parents ever loved each other. They might have had some physical, sexual attraction at the beginning, but I know it generates nothing, because all through my life I remember nothing but their open hatred for each other. I mean, there was no two ways about it. It was all out in the open, all the hostility they felt for each other. Now, Don, if he ever witnessed hostility, it would be of the invisible type, and I guess perhaps that might even be a worse kind. By invisible I mean there's no yelling or scenes, but I guess children can feel an antagonism. I don't think our hostility was with the consistency—our hostility was a spasmodic thing, because I know for a fact we would go for the longest time and everything would be fine, and then there would be a setback of one thing or the other, but we'd make up, and so on. Now, the last couple of weeks, my wife and I, as I told you, have been going through a real kind of a hell, where we couldn't communicate, and I've withdrawn. I figured I had to solve my problems and when I do I'll be able to manage her and so on. She, in the meantime, was becoming frightened—gee, I noticed a sudden increase of tempo, as I speak—ah, she, in the meantime was becoming frightened by my withdrawal and, ah, with her own insecurities and whatnot becoming intensified by this, ah, she sort of started to withdraw from me. It was a horrible situation, but we did have some very good talks, and we find that when these talks are over we always love each other a great deal more and cling to each other, and feel warmth towards each other. And whenever we do fall in love again—I have to use that expression—it's always a bigger and deeper and more meaningful love than what we had when we got married, because now we know each other sexually; I think we know each other inside out, sexually, and we didn't then. So now, whatever feelings of love do come about. . . . cover more areas than just a physical—I don't know if I can make it clear, but it's a different kind of thing now. And when we are in that accordance, in that parallel, then we are really very happy. And so far, luckily, we always come out of these scraps with such a talk, with such an emergence that then there's this glowing feeling. I would hate to think of the time when this couldn't put an end to the hostile periods that we go through. At least we know we're saved by this feeling of love that comes out of it. Of course, I'd love to see these periods of hostility go altogether, for crying out loud.

But I know with my parents—I couldn't conceive of the two of them loving each other; I remember them never kissing each other, and my wife and I frequently kiss and hug in front of the children. And many times, for instance, we draw Don into it and we go through the whole thing. Now young as Herbert is, he'd have a very perplexed look on his face, as if to say, "What the hell are they doing?" Herbert, I'm sure doesn't know what the hell we're doing, but at the same time when he sees us do this—and this happens every time without fail—he always laughs and and he always seems to be made happy by what he sees. Now Herbert is much slower than Don in many ways, and therefore I think he's going to be a lot better off for it. I realize he is slower only because we let him alone.

Dr: How many months old is he now?

Pt: Eleven. Yes, four-and-a-half years difference. You see, we leave Herbert alone more and yet he, I know he knows he's loved. With Don—we used to stand over him. He was talking at a year and doing a million things. *Never before have I been more aware of how many parents do this with the first-born. We see it around us all the time: they're constantly pressuring their child and setting goals way the hell in front of him; and then the child breaks his neck to keep up to these speeds and to try to measure up to these goals; and then finally he starts to find he can't, or maybe he doesn't want to. . . . and that's when the deck of cards starts to collapse.* That's exactly what I think Don is going through, in addition to this Oedipus thing. I think this is all being thrown back in our faces now by Don, because Don, in truth, is a brilliant child, and he's using this intelligence to take the ammunition that we have sort of fortified him with, and he's throwing it right back at us. And, in plain English, it's a bitter pill to swallow. Herbert, on the other hand, has received very little pressure and expects very little, is frightened by very little. The only pressure in Herbert's life is Don. Because every once in a while, when Don gets rambunctious, it's extremely interesting to watch the way Herbert will smile but will look at Don with a wary eye, you know. As soon as Don shows the slightest bit of a smile or a friendliness, then Herbert will light all up. But he has to, he knows he must, defend himself from Don, and it's such an interesting thing to see. Because he absolutely loves—he goes into ecstasy when Don plays with him. He just jumps all over him; he screeches and he absolutely loves it. But every once in a while, when Don is sitting and watching television or something, Herbert will go climbing into his room, and Don won't make a move; he'll just sit in a chair like the king, you know, and say, "Get him out of here" (laughter). And Herbert looks so perplexed when you go dragging him out of the room, as if to say, "I didn't do anything. What do you want from me?"

(*A section that might identify the patient has been omitted.*)

Pt: Ah, perhaps I don't remember as well what happened last time I took LSD. Physically, I don't think I had this much, not the feeling of nausea, but as if on the verge of gagging. Perhaps it's the material that I'm uncovering. You know, all the things I keep saying: "It's a hard—it's a bitter pill to swallow; it's a tough thing to take; it's a tough thing to say," etc. Could this possibly contribute to this feeling, or is it just strictly a biological—or a matter of both, perhaps?

Dr: It could contribute to the feeling very well.

Pt: Mmm. Because these last few minutes I felt—oh, a million thoughts have been running through my mind, and now I'll be glad if I can get some of them out, because I think they're all very important. This is something very interesting: This is the first time that I can remember when I felt that it was too bright in here.

Dr: Would you like me to cut the illumination down?

Pt: Well, when I say "too bright" I don't mean that it's uncomfortable, but it seems as though I can't talk. I might be better able to talk if it were a little more dim. Now, this is something new with me.

Dr: No, it's a perfectly reasonable request.

Pt: Perhaps it's as though, since I'm reaching in the dark, I want to try to recreate this kind of atmosphere. I had a very interesting thought before—first, before we go any further—I'm scheduled to finish here at 4:30, is that right?

Dr: Yes.

Pt: Now, because I couldn't get anyone to pick me up, the only one that could come here was my friend, and he can only pick me up fairly early, which means 4:30 or 4:45. Now, does that create a problem?

Dr: Well, it's a slight problem. I don't think you should—

Pt: Because usually you have me hang around a while.

Dr: I think I should like you to "hang around" because your reaction will be tapering off, but I can give you a seconal. I wouldn't like you to leave until about 5:30, if that's all right?

Pt: I think that would be almost impossible.

Dr: Almost impossible—

Pt: Well, let me tell you how we operate this thing. When my friend picks me up, usually we ride home on the train to his home, and then he drives me from his home to my house, you see.

Dr: How long will it take you to get home?

Pt: Well, it will be more than an hour.

Dr: I see. Well, by that time the effects will be—

Pt: As a rule, yes.

Dr: Well, don't go wandering away from him. Stay with him all the time.

Pt: I know you always warn me about this, but I couldn't conceive of myself just wandering away.

Dr: Well, it's true you've taken a fairly low dosage, but still you won't be over it until about six o'clock.

Pt: Ok, well, that's that. I don't want to take advantage of his time. I had an extremely interesting thought, important thought. I remember telling you that in my adolescence, especially my early adolescence, I was a very habitual, if there be such a word, masturbater. I masturbated in excess. It was as though I were carrying out this dream that I told you about, with this constant depleting of the sperm supply, so to speak. And in reviewing all that I've discussed today, with the thoughts of death and the intricate relationship and identification with four males: myself, Herbert and Don, and my father . . . it's as though I'm now fighting very hard within myself to identify with my father, instead of at the age in which I should have been doing it. *In looking back I think I identified very strongly with my mother. And I don't know if I can draw these pieces all together, but in thinking of the time that I was a habitual masturbater, or masturbated to excess, it was during this IRT, BMT time, and it all seems to begin with that death on the tracks. It almost seems as though I were trying to kill myself for having thought of killing my father! I mean—I'm speaking very broadly now, but in view of this reaction of mine to this death of a man whom I did not know—and I wasn't even sure, and yet, I was sure. Emotionally, that man was my father, because I started crying. I started worrying about him, and so on and so forth. It almost seemed that at that time masturbation* *could easily have been a sort of self-punishment. . . . Somewhere, in all that's going on right now, something of a similar nature is taking place; with me and Don, or Don and me—I don't know which way to put it first.*

Now, I know that in the past you've said that my reactions to Don are based on my reaction to something between my wife and myself or with a reaction to myself. *But here, I think, Don, at this stage of his life, is exposing this sort of hitherto or heretofore unexposed area of my development or lack of development, which could very well, now that I think of it, have contributed to my feelings of—in an exaggerated way; the feelings of the small penis—things like that. . . . I wish I could get something more out of that and I can't.*

Dr: You said you identified with your mother, in part, as you grew up?

Pt: In looking back, I think I identified with my mother much too much, and this could have only—

Dr: What makes you say that?

Pt: *It seems weird to me now, but it might very well be because at the age—well, let me put it this way: All through my life I remember my mother openly expressing death wishes toward my father.* This is a very common habit of a type of overemotional housewife of the previous generation. I didn't only hear it in my own home, I heard it in other homes, too. You know, you've heard accounts of this, I'm sure: "You should only be run over by a truck; you should go out and not come back again,"—that kind of stuff. I heard it all my life, and I realize that as I say that I start laughing, and I realize now I laugh only because it must have been very unpleasant. And I think I laugh about a lot of things that are unpleasant. Well, primarily, scientifically, in laughter our unhappiness is being recognized by those who are listening to us. Now, this is very warped, I think, but I'm going off on a tangent. I feel that perhaps laughter, even if only based on how many times we laugh at a thing that we really don't want to laugh at, as I did before, when I mentioned when I went to a movie and I wanted to cry; as I said it, I sort of laughed. You pointed out to me, "But you didn't have to." I realized that I did. And I realized how many times I do this in ordinary conversation, and how many other people do this constantly. I don't know how far off base such remarks are, but I'm wondering, as I say this, how many comedians today have even scratched the surface of this type, this train of thought. . . . It seems as though—and I've said this many times before—when I am kidding or something, I want to be laughed at. And if I become serious about something, and then some one starts to take that seriously, too, instead of getting encouragement from this, I begin to feel an inadequacy, as if to say, "I'm really not that good. I really don't have that much ability." And then I'll turn that into a kidding: "See, I was joking all the time. I'm not really artistic. I was just kidding, see?" But if you really get right down to it, I can't, I'm not—I'm not properly trained; I'm not properly, ah, schooled in art. But, I, by some miracle and my very keen artistic sense, have been able to capture enough to work with it. And here we come into the area of my constant conflict between my actual means to earn a living; what I want to do; and also my conflict with you in regard to training and schooling and so on. Now when I got out of high school, I couldn't wait to get out; I hated school, yet I was a fairly good student. It was almost as though I wanted to get the best marks so that I could get out faster; not to do anything with it, just to get the hell out of school. When I got out of high school many students were taking advantage of, ah, of scholarships and so on, to which I was entitled; I had the average and everything. I couldn't even think of it; I wouldn't even dream of going to college. I said, "Hell, what am I going to get out of college?" I wanted art and that was it! I didn't think I could get anything out of college in connection with art. And yet when I did try to study seriously on my own through a scholarship—ironically enough, before I ever learned a thing, I was already on my own and I was capable of doing good work on my own; I had studied with the best. And I had a good school and good teachers, which is a rare combination. But I had this one woman—I remember speaking of her in the past—who was a very prominent teacher. We used to have tremendous fights. I was then 17-years-old, and she was a very masculine type of woman. Now perhaps it's unfortunate that I didn't have another teacher. Perhaps if I'd had another teacher, a more feminine teacher, or a man, a more masculine teacher, I might have been responsive to the training. I remember they kept saying to me, "Why do you fight so hard when we tell you to do this and that, when you have this tremendous ability?" And I said, "Because my prime reason for coming here is not to be an art gallery artist. I want to go into commercial art, advertising." And then they said, "But to do that you must have training." And I said, "I don't think so." And even then, I was showing such definite signs as I am now, in fighting a technique of learning. I always wanted to learn it my way. Because whenever I did learn things my way, I learned fast and well.

Dr: By whose criterion?

Pt: By my criterion—well, no actually; by anyone's criterion when they observed what I did learn on my own. I know this: To this day, when I have talks with certain men in the field, they're astonished by my know-how with the very limited education that I have, most of which was self-education, trial and error. Mind you, I realize that there's nothing like schooling for that, more so than for anything else. And yet, I've become too deeply entrenched in the business world, with the income that I can get out of it and so on—potential income. This is, by the way, something that we spoke a great deal of Saturday night with my cousin. Of course, even as far back as 1946 and 1947, I felt a very close relationship with this man, because he was a very, by my standards—I have never met anyone like him before; a man who had a great understanding of my background; not mine alone, but our background and tenement living. He was a product of it, and at the same time knew so much of the other side of the fence, because actually he was the first one who ever pointed to me—pointed out to me the connection between allergy and asthma and disturbances of the mind and the emotions. This is as far back as 1946, when, intellectually, I found much merit in what he said, and I agreed, yes; but then, emotionally, I wasn't even nearly ready to accept it.

Dr: Could the same thing be true as far as your studies go, or your proposed study? Intellectually, you accept it, but emotionally your narcissism blocks it.

Pt: That's very possible, very possible.

Dr: I've been emphasizing that for a long time.

Pt: Yes, yes.

Dr: But there you have the analogy very beautifully constructed.

Pt: Now, again, getting back to my father: There might be an area in which there is more identification on which we haven't touched; that is: My father was always, in my eyes, an intelligent man; certainly, again in my eyes, much more intelligent than a lot of the other fathers in my neighborhood and in our economic and social level. He was well read, something of which I was very proud; I used to love him for that. I used to feel that he was something great in that he had read Dickens and Shakespeare. He was a lover of the arts. I don't think he was too aware of, or keenly appreciative of, the musical arts, so to speak; I'm afraid I'm that way, too. I appreciate good music every so often, but my interests lie more in art; although in school I was very good in music. And many times I thought of taking lessons in that field, because I remember in high school they always used to want me to play in the school band, and I wouldn't because it would take up too much of my free time (laughter). Jesus Christ, free time! What the hell did I have to do at the age of 14, 15, and 16? Now, in view of all that I've said today I can easily understand what I had to do: nothing but masturbate, it seems. Instead of doing something constructive, I seemed bent on doing something destructive. And now, as I said "bent," I go to something very interesting. My posture has been the source of discussion, oh, a million times, all through my adolescent life and right up until now. I remember asking you, do asthmetics—That's interesting, I said "asthmetics," getting the word *cosmetics* mixed up with *asthmatics,* but—

Dr: It could also be "ass medics."

Pt: Eh? Ass medics? Medics are asses?

Dr: That's right.

Pt: No, I don't—I doubt it. *Cosmetics* was the important word, there; at least that's what I grab. Ah, I was just thinking as you inserted the "ass medics," that that might be just a little—a little drop on your part (laughter). Getting back to—oh, yes. Up until I was 14 or 15, I think 15—oh yes, wait, let me—Christ! Before I get into that: I remember asking you, "Do asthmatics necessarily have bad posture because of something that happens to their spine as a result of severe coughing spasms, etc., and medication and whatever in hell the process is?" Now I would say that this is possible if an adult is an asthmatic since childhood—infancy. Isn't that true?

Dr: Why yes, the whole chest—

Pt: Ok, but asthma did not show itself in my history until (at least that I was aware of—let me put it that way: asthma as I know it now, with wheezing and so on) I was 16-years-old, and it concerned itself with the summer romance of Betty M., of whom I was speaking all the time. But my posture became noticeable to others, and then later to me, around the age of 15, when I went to Boston to spend some—to spend the summer with my cousin there, my cousin Esther, the librarian, and my aunt who is now dead, who was the wife of my father's brother who died when I was an infant of about one year. Ah, I want to get that thought back again—oh, yes. And she always used to, ah, smack me on the back and say, "Stand up! For crying out loud, you're such a good-looking boy, stand up!" You know, be tall. And my, my aunt, also my mother's sister, always used to say, "Stand up, for Christ's sake, you're walking around like a hunchback!" *And I can see now where, how much of my posture was physical and how much of it was self-inflicted punishment. Now more than ever, the whole area of masturbation comes out in a new way that I've never seen before, as to what it meant to my life. In other words, it all boils down to this; it seemed that to get even with somebody or something, if I wanted to hurt someone, it would be done through masturbation, even if it meant hurting me, even if it meant a drainage—again I speak exaggeratedly—but a drainage on my manhood, a self-imposed bad posture, since I was loaded with feelings of inferiority at that time anyway, during my adolescence; with big ears; with not being a good-*

looking fellow; and being short; and all that adolescent stuff. Ah, I was really wallowing in that kind of thinking between the ages of 14 to 17. And, again, I can see more clearly that instead of being helped by it, it seems that I became more frustrated. Again, I see a little more clearly some of the things that are happening in Don. It causes an alarm in me, and of all times when I should be strong, and of all times when I should be a healthy male father to Don, it seems as though, again, I'm turning a lot of energy into hostility and aiming it all at Don, almost in the same way. I can't get any further, deeper, than that. But almost in the same way that, the same kind of, ah, feelings motivated me into masturbation.

And since I don't masturbate now, it almost seems that I feel—Gee, this is very interesting. How many times have I told you of how I would act this way with Don and feel rotten, inadequate, inefficient, degraded, all these words, which you could—by you, I mean, one could, or I could—put right back into anything with regard to masturbation; the thoughts, guilt, dirt, all these feelings that, as I said, I must have been wallowing in, and which I must have carried on for a long, long time in my attitudes towards anything sexual.

Isn't this interesting? You know, what just came to my mind? Ah, my wife doesn't know it, but she did me a very, very big favor. Saturday night, the night before I had this dream with all the sperm coming out of my penis, and in the beginning of the sequence with sexual feeling—not a feeling that I felt, but I mean, it was attached with something sexual, very similar to what it was like when masturbating, although I wasn't actually in the dream. And then, later it changed to just urinating, but blobs of sperm kept coming out and I was saying, "When the hell is this going to stop?" Almost as if to say, "When is all my need for analysis going to stop?" You see? It almost all seems to be centralized in that area; my whole identity with analysis right now is starting to become focused around that area. But anyway, getting back to what I was going to say about that, my wife and I went to bed very much in love that night, and we kissed and held each other and so on. *But when we were loving each other we didn't have sexual intercourse, but regressed to our adolescent selves.* So that's what I meant when I said that my wife in a great sense, in a great measure, did me a very big favor that night—I think through that very vivid scene—after all, that was Saturday night, and look how many times I have a dream which I can't remember minutes later. And here was a dream that I had Saturday night, and it was there in front of my eyes every day since then.

Dr: Would it be all right to take our break now, or would you feel frustrated?

Pt: No.

Dr: All right.

Pt: You see, before, I felt frustrated, but now I don't feel so frustrated.

(*Rest period*)

Dr: Let's see. The time is now 4:00 o'clock.

Pt: In the last five minutes I followed my usual pattern of tying up my little package, and I think I got something very definitely significant to me that has gained me a new plateau in understanding myself. Because what I get out of Betty M., in the dream with the pajamas, and Fred S., and that plane, and the subway station, and all this put together, I think adds up to this: that as a result of circumstances, the professional field, and my economic status, and so on, and as a result of the inner workings of my family and the emotional reaction on my part resulting from the inner workings of the family, the formula has been equaled. *In other words, pretty much the same elements have been added together to bring about the resulting reaction; and that is, all of the elements in my life, of the teen-age life, I think, have added up again in my not being able to react because of this Jack C. (myself) aged 14, 15, 16, 17, 18, 19, 20, 21. I have become, in my feelings, adolescent again, and that's why my wife was not Mrs. Jack C., the wife, but Joan L. (the patient's wife's maiden name), the girl that I knew when I went with Betty M.; and I, Jack C. became the Jack C. of that same time.* Now, in those years there was no daughter, no Don and no Herbert, so it almost seems, again, I can only speak in a very exaggerated and broad way. It almost seems as though my children are preventing me, within my mind, from functioning in a clear way, and by "clear way," I mean the clear way of my teens by my standards. I remember in the very early part of my analysis, you mentioned that you—in the way I described a certain thing; I forget which it was, but I don't think it's too important right now—but it was just that expression that you used that I liked, and I told you that I liked it. Oh, it didn't solve a damn thing for me, but I liked hearing it. And that was: You said that you felt that in what I say and how I say it, I am covering up something of a volcanic intensity. Do you remember that at all? It's a long way back.

Dr: Go ahead.

Pt: The expression, "volcanic intensity." I liked it, because, in truth, it was true. *And it seemed as though I liked hearing it because it was as though someone else knows;* I no longer have to carry this by myself. And, oddly enough, in spite of this, how I continue, how I continued, rather, through the years to fight you on many things; at the same time there was a feeling of relief and satisfaction in knowing that it's off my chest, it's been gotten out, and it's shared by someone else. What's extremely interesting to me is my use of words today, just now, in describing, what came about as a result of the discussion of masturbation: dirt, guilt, rotten, low—all these words. I can see now what a tremendous weight I have been carrying around; I must say, right up until the present. *And in many ways, in my sexual life with my wife, I have gotten rid of a great many of these adolescent feelings, but it's obvious to me, now, not entirely. And somehow I feel that because I am so aware of it, I think it, I don't think it'll be a burden any more.* Now I don't know if I'm talking as a result of some kind of euphoria that comes out of all this, but, and what I'll feel like tomorrow, but right now I think that it's real. Ah, if I may ask at this time; "Is it often that a patient will leave an LSD session in a state of depression? Or would you say for the most part they leave with a feeling of, an elation; feeling as though they had gained something? Which would you say?"

Dr: At this dose level, by far, the feeling of elation.

Pt: Well then, may I ask: "Do you thing it's realistic? Or is it just a chemical phenomena?"

Dr: I think it's both.

Pt: In other words, it's an emotional achievement through the use of chemistry?

Dr: Yes.

Pt: Gee, it almost sounds like I read that in a book. You know, I have such a weird vanity, as do we all, I guess. But occasionally someone will show me a letter that I wrote to him or her many years ago, and although I might read something in it that will sound like tripe, I'll say, "Oh, gee, did I write that?" Yet, I'll find a sentence now and then that is made up in such a way, I'll say, "Jesus Christ, that's brilliant! Did I say that?"

Dr: The pilot was struggling to prevent the biplane from crashing on the tenement.

(*The therapist decided to go back to the content of the dream.*)

Pt: Now, that's funny. The very first thought I got was: The abrupt injection of that in the middle of this talk was perhaps—my talk now is the pilot struggling with the plane to prevent it from crashing on the tenements, and so on. Until now, I didn't know who the hell the pilot was, and now I think that in the dream I was the pilot struggling with the plane and with all that I have learned and all that I was fighting in my daily life, to prevent my feelings from getting so out of hand that I would end up crashing on those that I love: my family, my children, and my wife and myself. Now there has been a lot of talk in the past few weeks or so of death and self-destruction and, in one way or the other, of doing away with myself—things like that.

Now the funny thing about it is that in true life I don't think I could any more carry out an actual suicide than fly to the moon on a shoe, because I remember my father many times—and this is probably important: When he'd read about this one committing suicide, or that one committing suicide, he used to say openly—and this was in my teens that I heard him say this—"There's a brave man." And I used to argue with him; I used to say, "There's a coward." He said, "No, it took guts to do what he did." You see! So that even at that time my father was, ah, openly expressing a desire to die. Although, at that age, I interpreted it merely as philosophizing: I didn't interpret it as having a meaning other than a point of view. And I used to argue, "When you commit suicide you're dead, you're finished, that's it; you don't have a second chance at bat, no matter what." I said, "The guy who has the guts is the guy that'll hold on and just keep fighting, because as that old joke goes for the difference between the two twins—you know, one is a pessimist and one is an optimist and they put them both in a vat of shit. Did you ever hear this joke?

Dr: No.

Pt: They take two twins, two twin brothers; one is an optimist and one is a pessimist; and they put them in a big (laughter)—they put them in a big vat of shit, you see, and the pessimist says, "Oh, God, I'm going to drown in this horrible wretched stuff; this is terrible." And the optimist says, "Gee, somewhere in all this shit there must be something good!" (laughter). And he's looking for toys and goodies in all that shit! That was one of my prime lines; I used to always say, "As long as you keep fighting, somewhere in all this shit there's something—there's something good." *Now I've noticed for the first time, when I told this little joke, it made my pulse pick up tremendously.* Now I don't know whether it was because of the excitement and laughing and telling the joke, or whether it was just, ah, some feelings I had with regard to this sentiment, but it is a sentiment which I have often voiced. Because when all is said and done, I love life. Either it's that way, or I'm just plain afraid to die.

Dr: I don't understand, when you say that we've been talking about death, and self-destruction.

Pt: Well, there has been a lot of discussion. I have said a lot in that line in the last few visits. I know I have; I remember it.

Dr: Would you mind going over that again; what you have in mind?

Pt: Well, I can't remember that specifically. But I remember just a few visits back I chatted about my friend's father who died—suicide.

Dr: Oh, yes, I see. You mentioned people who died, yes.

Pt: Yes; but then, also, in a lot of my dreams it seemed that

I was having so many hostile wishes toward Don—primarily there is this feeling of self-preservation. In other words, to preserve yourself first, to live first. Now, romantically and according to novels and all, there are people who believe you should lay down your life for duty and love and all that. But I think the, the first reaction to a—of a human being, as an animal, as a living thing, is to preserve his life and then to preserve the lives of his loved ones.

Dr: The plane flew off diagonally to the tracks, I believe.

Pt: Across the tracks.

Dr: Yes.

Pt: Well, that's like my route. I've been flying over my own tracks for the last four years, always struggling to keep the plane from crashing. . . . As you say, "diagonally," I just picture the word "cross section." And cross section means the—cross section is analysis, it's a potpourri of everything; and diagonally is the—is the—the wire that, ah, that I walk on in analysis.

Dr: Now, if we take your point that your masturbation represented a technique of dealing with an inner struggle—

Pt: The—the what?

Dr: Your masturbation represented your technique of dealing with some inner struggle—

Pt: A technique, yes.

Dr: —and add to that the fact that your identification with your father was unsatisfactory, and that you identified with your mother somewhat; and if you did identify with your mother—

Pt: To push that a little further, since I could not have any sexual relations with my mother, emotionally, it would almost seem as though I would have them with myself; which I think points out more the fact that I identified with my mother, because I wanted to do it to myself.

Dr: Self being mother?

Pt: Yes.

Dr: Then that, of course, would disturb your relationship with your father.

Pt: True.

Dr: Which we've already worked out in your analysis.

Pt: *Yes, but in the new light of my life today, it could have a lot to do with my butting in between my wife and Don, when Don, at his tender age of five-and-a-half, displays more realistic sense than I when he says to me, "Don't butt in, this is between Mommy and me!" You see?*

Dr: Betty M. was in pajamas.

Pt: Well, this is a very strange thing. At the age of 17, 16, when I had this infatuation with Betty—Betty was an unusually physically mature girl for that age, as compared with all the other girls in our crowd. She was very voluptuous; she was very big busted; she was very feminine looking. And yet, even then, I did not desire her in that way. I desired her in a nominal sense only; in other words, I only wanted her to be my girl friend. I'm saying this almost sarcastically, as a teen-ager would say it. I wanted her to be my girl friend, because if I were to have had her as my girl friend, this would have been the symbol of all that a teen-ager could have in a girl friend; but even that was so unrealistic then. And I think now of all the teen-age scenes that I see around me, where the "going steady" thing is the new religion, so to speak. And I realize now these kids don't know which end is up. And I think their position is even a bit worse than mine in 1942, because they have many more methods of mobility and escape and hiding than we did. And instead of lifting themselves out of their confusion and despair and conflicts and the feelings that they have, they only pull themselves deeper into it. This, of course, doesn't go for all of them, naturally, but a great many of them. I think it has a lot to do with contributing to this increase in juvenile delinquency and so on. But today—it's a funny thing: Betty does not represent any excitement to me whatsoever, nor is there the desire for the Betty of that time. I just think that the whole Betty symbol in the dream is really my wife and that whole time, perhaps, perhaps, a symbol of my wife's meaning to me, all of our married life; in other words, not to have entirely as a woman, as a man would need a women, but just something that is expected of you to have. In other words, doesn't everyone get married? I'll get married too, even though I'm 20-years-old. I feel safer with my wife; I know her. These are thoughts I doubt very much if I thought of at that time, but, trying to project myself into that time, I think this is what I must have been holding on to. There was no thought of my wife as a sexual partner, a real sexual partner, as a woman, but as a boy friend and girl friend playing house, very much at a childish level.

Dr: How do you feel?

Pt: All right. Feel good!

Dr: How much effect of the drug is still present?

Pt: Some, but not as much as before.

Dr: Would you like to take a seconal now? That will cut it down a little.

Pt: I don't feel the need for it, but if you suggest it—

Dr: No, no. How do you feel about this dose of LSD? Do you think it was too high or too low?

Pt: I can't argue with you. I don't think it was either. I feel, in looking back on all the—how many times did I have this? I think this is about the fourth or fifth time.

Dr: Fifth, I think.

Pt: I think it is the fifth. I find a lot has to do with your state of being at the time you take it.

Dr: That's correct, yes.

Pt: Because I have slept very little these last few weeks. By very little, I mean compared to the amount of hours I usually get. I've looked more haggard than I've looked in a long, long time. I'm more tired, and I'm not doing that much work, so I'm draining myself emotionally, which means I'm in a sort of low physical state as well as emotional state. So perhaps coming in this way, I would react in such and such a manner to so many micrograms. Then, if I were to come in with having had several weeks of good sleep—but then again, there would be no call for LSD.

Dr: There might be, though.

Pt: Actually I have, as you know, been struggling with myself as I never have before; I mean, everything else, sure, was a struggle. This was a struggle, that, up and down. It seems that this was the toughest struggle of all, and I didn't know with what. And it was that big "X" that was driving me crazy.

Dr: Now, do you think that our three and a half hours today will help solve that "big X"?

Pt: I think in many ways it has. I don't know about solve, but I'll—

Dr: Help solve?

Pt: Well, I'll say this: In many ways it has already been at least identified. It has thrown light on the big darkness, the big nothing that was there, you see. And, even if only that, it's like what ——— said. About two years ago, he wrote an article on what psychoanalysis had done for him. Did you ever read that?

Dr: No.

Pt: All those who know him read that and laughed. They said, "This guy is nuttier now than he ever has been." But they said it made a wonderful article.

Dr: Has he been analyzed?

Pt: Yes. They said it made a wonderful article, and for those who are thinking about analysis this will be a great thing, a great thing. But they said it hasn't helped him a bloody bit, because he can intellectualize and carry on. But he's a bigger nut than he ever had been. He did write one thing that caught my eye. He said in many ways analysis to him was like walking into a dark office, all the lights out; it would be pitch black—and this is before analysis: There would be a desk in front of him, and he banged into the desk, and he didn't know the desk was there until he banged into it. But he said analysis put the light on in the room, so that he didn't necessarily remove the desk, but he at least walked around the desk. And I liked that;

I don't know what it was, there was something about that which to me was so well put. You yourself have told me many times: You can't throw things out or remove them as though they had never been there, but you learn to deal with them in many ways. Let sleeping dogs lie? Not in every respect, but in many ways.

Dr: Do you want to leave with your friend now?

Pt: I can, unless you think we can talk a little more.

Dr: We can talk a few moments more.

Pt: Ok. Well, another thing about feeling a little unpleasant; I did notice this: For the most part I felt a little odd. But every time I took a cigarette, after I smoked a few puffs, I got that feeling, now that I think of it; whereas normally a cigarette doesn't create this feeling at all, but yet with LSD in me, ah, it did.

Dr: But LSD affects the nervous system; the body as well as the mind.

Pt: As does a cigarette or tabacco or alcohol.

Dr: Or else the act of sucking might—

Pt: I was just thinking what a thing it would be—I wonder if you've ever done—I doubt it; you've had no experimenting along these, although it would be interesting. What would happen if a person had LSD in them, and then instead of a puff on a cigarette had a highball.

Dr: Oh, I've done it.

Pt: Yes, well, what happens? Is it intensified or deadened?

Dr: It's a long story, but it depends on the—

Pt: The person?

Dr: The amount of alcohol and the kind of alcohol.

Pt: And the person, and the mood, and the receptiveness, and you're right back where you started. Oh, well sure; that's why I have to go home with someone—right?

Dr: That's right. You've put your finger on it.

(End of LSD Session)

Dr: This is January 29th, one day after the patient was given LSD.

Pt: I remember, consciously, a lot of what was said yesterday and I started to review it, think about it, and look at other things in a different light. Now, for instance, last night something happened to me that really struck me as being a little odd. For instance, after I was home a while, and I was in our bedroom, I noticed a little nick in the furniture and I said to my wife, "Gee, do you see this?" And she looked at me askance and she said, "That's been here since we moved here." In other words, it's been there for years, in the same spot, and it's not a hidden spot. It's not near a wall, it's right out in the front, and I've never noticed it. And last night I noticed it. And then, in Don's room there were a couple of paper dolls. You know, when you cut sheets of paper or something and then you open it up, you have dolls. They were taped on the wall, and I said, "Oh, did Don make this in school today?" So my wife said, "He's had this up on the wall for about a year." It's as though I noticed these tiny little things for the very first time. Now, they have been under my nose, practically. I felt that was very odd. It just struck me as being odd that I never noticed them before; noticing everything else, why not notice those little things? And, the stimulus to the thinking processes, as I said, lasted very long, because I found my mind was really—

Dr: That's why I wanted you to take seconal when you left here. Do you begin to understand why now?

Pt: Yes, oh yes, but it didn't affect me in the sense that—

Dr: Well, it might have. You might have talked too much to your wife. No, I really advise—

Pt: I talked to my wife but I don't think there was anything as—all I said was that I loved her.

Dr: Of course, that's all right, but still—

Pt: But, yes, I understand. Although I must be honest and say that in the past—

Dr: Well, in my LSD experiments the men have their wives bring them to the experiments and take them home after the experiments. But the situation is a little different.

Pt: Yes, yes, I can understand that. In the past, when I would come home after an LSD session, I found that there were very little after-effects of which I was aware.

Dr: Yes, but—

Pt: It seemed as though when I got home, it was as though nothing had happened, except that I would think in terms of what I had said, and I'd think over what I had said during the day, ah, during the session. But last night it was truly a different reaction. It was as though the LSD had had a more lingering effect than previously.

Dr: Any dreams?

Pt: Yes, that's very interesting, too, because when I first woke up, ah, I said, "Gee, what a sound sleep I had last night. The best night's sleep I've had." And I said, "I didn't dream. I didn't dream at all." And then I said, "Well, it must have been the seconal I took before I went to sleep," which I guess has nothing to do with the dream at all. And about 10 minutes later, it suddenly came back to me that I did have a dream. The dream came back to me suddenly, and it's a continuation of the same kind of dream that I have had the last two times or so; one thing in particular. It seems like certain symbols of the dream were amplified. For instance, ah, remember I spoke yesterday of a dream about the plane and the tracks and so on, and I also very briefly mentioned about a motorscooter. Remember that?

Dr: Yes.

Pt: One of these small motorscooters, and I said that one of the plastic covers that might have covered the engine or something had a mark on it as though it had been burned. You know how plastic burns when it's near direct heat; it looks bubbly and it shrinks down in that area and burns away; melts away, sort of. Well, last night, in the dream, there was a motorcycle; not a motorscooter, but an actual motorcycle, that I was driving. Now, I have never—well, that I can remember—I've never dreamed of being on a motorcycle. I have many times dreamed that I was in an automobile, or just maybe flying by myself, or something like that. But, the night before last was the first time that I dreamed about such a thing as a scooter, although I didn't remember driving it; I just remember sitting on it, or I had it or something.

"But last night I dreamed that I was on this motorcycle; actually driving it. I asked someone the direction to a certain place, and they said you have to go to such and such a street and make a right turn until the end of the street, and that's where you want to go. And it seemed that the street that I wanted to make the right turn on was a big avenue type of thing, and it was Woodburn, or Woodbury Street, or Wood—well, in the dream—it was Woodburn or Woodbury. And I remember that when I made the right turn on the motorcycle, I was a little apprehensive about the speed of the motorcycle. It seemed to me that it had a lot of speed and I had to be extra careful of the way I handled the speed. And also, when I made the right turn, I became very tense when I lifted my arm to make the signal to the car behind me. In other words, it wasn't like making a signal in a car, where you have a hand on the wheel and you just put your other hand out. But this was a matter of balancing myself on the motorcycle, controlling the speed while making the turn, and holding my left hand out to notify whoever was behind me that I was to make the turn. After I got to where I was to go—I don't remember where I was or what I had to do, but I do remember I had to go somewhere. And when I came from this visit with whomever I had to see, the motorcycle was parked near the curb and one of the wheels, I think the hind wheel, the back wheel was bent. In other words, it was no longer a circle, but the wheel was bent as though it had been his by either a passing vehicle or the motorcycle itself was damaged.

Now the next thing I remember, and I don't remember the exact sequence, but I was in ——— which is the city in which I was born. And while walking down the street, I was passing blocks and blocks of apartment houses, red brick apartment houses, four floors, and they all seemed to look like the kind of apartment houses you saw near the East side section, which is a better section. And while passing each block, I remember looking up at the street sign at the corner, and every street was very vivid. I mean, every sign was very vividly marked, very clear, and each one had a different name. And yet, now I can't recall any of the names. There was this and this avenue, that and that street, such and such square. But more interesting than that was the fact that somewhere along the line I was walking down the street and the sun was shining, and the buildings, although they were not big buildings, looked extremely big to me, and I, therefore, was very small. In other words, these weren't skyscrapers; these were just regular store buildings and offices; two, three, four floors; just like all the other ones, except that now they looked very high, very tall, almost as though I were reduced to a, to a—not a child, but even smaller than that; almost like a little animal or something. And one sight in particular that stands out in my mind was that on the right hand side there was sort of a church, and in either a garden of the church or part of the church, I'm not sure, there was a tremendous, but an ever so tremendous, statue of some kind of God, or something that looked like Jesus or Buddha, or something. You know, one of those religious types of shrine statues, and it was tremendous. It towered way up into the sky, and I remember looking up at it and saying, "Boy, what pictures you could take around here with a camera." Now, the next thought I remember, the next dream I remember—now, this one is really a weirdy.

There was this little midget, and this midget was supposed to have been in the service and everything. In other words, this midget had a history that everybody talked about. It seems as though this midget was in the armed forces in the war. The midget did not look like a regular midget, in other words, like a boy. You know, most midgets look like a—I'm not talking about about a dwarf, now, but a regular midget. They look like a, you know, little boy of about 9 or 10 or 12. But this midget looked like a baby, a big, pudgy baby; you know, with little rolls of baby fat and the face all round and pudgy looking. But the baby did not look like a happy baby; he looked worried; he looked frightened. And I'm not very clear on the next episode which concerned the baby, but it seemed that he kept looking at my cousin Mary from Boston in a very frightened and almost a guilty way. And then, of course, comes the wonderful punch line: I don't remember how or what, but suddenly I was aware that everyone around was in horror at this baby who went staggering away with an arrow in it. Now in the dream I don't remember the arrow, but I do remember that the baby's back and stomach were red; the suggestion of blood, as though it had been shot or wounded with an arrow. Again, I say I did not see an arrow, but I had the feeling that an arrow had caused this. And that's all I remember."

Now I can't help but feel that this was a definite reflection or reaction to all that had been said yesterday, you know, during the LSD session. There were a great many old feelings and old memories that were once again stirred up, but as you said in an entirely new way. And I was able to observe or look at or study these repeated memories and feelings, but with a new reaction, a new interpretation. *And perhaps what I get out of last night's dream, more than anything else, consciously, it seems to come in the form of a warning to me that we have* *come across some material that I was not as ready to handle as I thought I was.* For instance, when riding a motorcycle you do not have the protection of the frame of a car. You have to balance it, which means if you should hit anything you could fall off very easily, or you're much more vulnerable to being hit yourself with something, with some other vehicle. You're open to the elements: to the rain, to the wind and cold, and so on. And I think it was extremely indicative with my hand up as a signal that I'm going to make this right turn; the fact that the motorcycle seemed a little too fast for me; that I had to be extremely careful; with my right hand I was controlling the accelerator, which is on the handlebar of a motorcycle; and with my left hand I was giving this signal. This signal that I was making with my hand up in the air—you know, when you make a right turn signal you have your hand, your elbow is out, parallel to the ground, and from the elbow up your forearm is in a right angle with the other part of your arm—it seems to almost signify raising your hand in class when the teacher would ask for an answer to something, and those who knew the answer would raise their hands. Also, you raise your hand in school to get the attention of the teacher; to ask something. In getting on that wide avenue, it seemed as though I wanted to get on, although I was going to a definite place; it seemed as though I was trying to get on a wider, therefore, less hazardous avenue. *And although consciously I would not like to think that I'm not prepared to handle what came up yesterday, emotionally, I seem to think that that's what the dream is trying to tell me, because after a session I more or less end up with a bent hind wheel.* The hind wheel of a motorcycle is the wheel that drives it, but the front wheel is the one that steers it. And so, putting first things first, the front wheel comes first, because it's called the front of the motorcycle and that's used for steering. And that could more or less be your conscious mind that steers you through your daily life, and the hind wheel could be your whole unconscious setup; all the motivations, and all your driving forces; all your desires, hostilities, and memories, and everything that makes up the tremendous network of thoughts and memories and impulses and drives of the unconscious mind. Because when I came from this visit, the hind wheel was bent.

Dr: In what way was it bent differently than previously?

Pt: Well, it was as though it were ah—how can I draw a picture for you?

Dr: No, no, no, I mean, in what way did you feel—

Pt: Oh—

Dr: —after your LSD session?

Pt: Oh, you mean, now I should not talk about the actual wheel, but talk about the way I might have been bent?

Dr: Yes. You said, "I was not ready to handle the material I came across."

Pt: So it would seem—

Dr: In other words, the unconscious wheel had a stress? Well, you'd expect that under LSD, wouldn't you?

Pt: Yes. But this, I think, brought forth more than the previous, ah, sessions. This brought forth a lot of, shall we say, unpleasant material? In the past, if I remember correctly, all the LSD sessions brought up all kinds of things, some of which were unpleasant. But then, ah, compared to this, it seemed of a much more superficial nature. This seems so much deeper, so much darker; by darker I mean it was so much deeper and so much more hidden, and it was brought out—almost as if to say that this was brought forth with great reluctance. *Well, now, let me put it this way: To make peace with my conscious self, I feel that I must accept and use the information that had been brought forth yesterday; but unconsciously there is a sort of hesitancy or resistance; because actually I think the baby in me has been competing with Herbert and Don, and it has been killed off.* I might be getting a little, a little too classical or symbolic, but it seems to me that the baby in me has been killed off in last night's dream. . . . Now my father comes into this very strongly because of my cousin Mary being in the dream. I have heard that my cousin Mary had a tremendous crush on my father many years ago, because they were not very far apart in age: I think they were about 12 years, 14 years apart in age. And to a teen-ager it's very common that they—well, I don't know about common, but I mean, you hear often of a young teen-ager having some infatuation with an uncle, or an older neighbor, or an older relative. So when I say that this baby kept looking at Mary with a sort of a feeling of guilt and fear, this was more or less the way I was facing or trying to face the feeling that I had for my father. And in fearing this feeling so much, I think I added it to the already planted feeling for my mother; getting back to what we said yesterday about my identifying, that I thought I identified with my mother. *I think I put both images into my mother, making the mother, mother and father—almost. Now that I think of it, it seemed that sexually I was having an affair unconsciously —Here's where it gets really complicated to me, but I think it might be old hat to you—I think I was having some sort of sexual, an unconscious sexual thing for my father through my mother. Is that possible?*

Dr: Keep on talking.

Pt: Well, I guess anything is possible, but that's the way I seem to piece this whole thing together.

Dr: Go ahead, please.

Pt: Ah, and I think perhaps, I might be now, at this time, terribly flightened, alarmed—I was going to say "alarmed and frightened" at the same time and I said "flightened," which also brings into view the word "flight." Perhaps that is why I have been extremely hostile towards Don, because, getting back to one of the first principles that I learned here, hostility is fear, anger is fear. And this hostility toward Don on my part might have been activated by my fear of the tremendous emotional—sexual—problems that I might have been going through if my father, at that same age. . . .

Now I noticed this last night when Don asked me to play with him. As I've told you many times, he's asked me to play with him a million times. About the first two or three years, four years, perhaps, of his life, I played with him freely and happily. And most times I really played with him because I wanted to play with him; I used to get a big kick out of it. Many times I think people thought that I played with him too much; by too much, they mean that he gets used to thinking of his father as a pal and as a kid; there is such a thing, most people seem to believe. Whether that is so, I don't know. In other words, that seems to be a throwback to the old "keep a little distance and respect, and the difference between officers and men," etc., etc. But I never felt this, because I felt that when I was away from him I missed him and I wanted to play with him, that's all. And so I did, and we played together very well; lots of fun, and so on. But in the last year and a half or so, it seemed as though if I did play with him, it was with great impatience. I couldn't get enthused, and many times I would just out-and-out tell him, "No, I don't feel like playing with you." *Now last night, for the first time in a long time, I played with him, enthusiastically, with fun, and he absolutely lit up like a Christmas tree. He never whined, he never acted silly; he seemed to thoroughly enjoy the game. He seemed so happy, I think, that I was playing so freely with him, like old times. He was laughing, giggling, making little jokes, and so on. Now the last two days or so he'd had a cold in the nose. Remember, I told you about his nose being stuffed, and he goes into all kinds of wild things. Well, last night he went to bed and his nose was just as stuffed as it was the night before. And yet, he never once carried on about "I can't breathe," and so on. Never once did he do that.* He did ask, however, before he went to sleep, if we could give him another spray in his nose with some of this nose spray for children. So we told him, we showed him, that the sprayer was empty. "Oh, O.K., can I just hold the sprayer?" he says. "Sure," we said, and that was that. *So, obviously, it would seem to me that I have let off a lot of steam, because I definitely was able to handle Don last night better than I had been able to handle him in I don't know how long. And, needless to say, it felt very good. I think in a great part, in great measure, last night's dream was a reminder to me about what had happened to me as a result of the LSD session. Because, in a sense, all through analysis, I am constantly reduced or I regress, so that in a way, or in a sense, you become the big god, the big figure. And then again, on the other hand, so was my father the big god or the big figure when I was a little boy looking up to this very big man. And you remember my saying the buildings looked exceptionally big. Well, to a child all buildings look big. From the angle that I see this room here, as I lie on the couch,* *it looks much bigger than it actually is, because I am at a comparatively low elevation. The ceiling seems further away, and I'm right up against this wall, which makes the other wall seem further away. So, all in all, there seems to be a similarity between my reaction to the size of this room when I'm dealing with unconscious material and also the size of all rooms and things when I was a child. To add it all up, it seems to me what I'm saying now is that many of my feelings and memories of my very early childhood were—I won't say aired out—but certainly were brought closer to the foreground yesterday. . . .*

Now this is very interesting, too: for the past, oh, several weeks, several months, I guess, when we would discuss the insecurity of my profession, the doubts that exist, my wife thought that perhaps it might be a lot better if we could live in an apartment, so that we would never have the tremendous pressure, which somehow I don't feel—this is very funny: I don't feel that my house is a big pressure to me financially. I feel that if we were to live in a fairly decent apartment, it would cost as much or almost as much as we pay a month to keep up the house. But, in the meantime, the cash that you have tied up in your house, you could have tied up in investments and so on, to give you more return. The last two days I've had dreams that were very obviously trying to show a lot of multiple dwellings and apartment houses. And it seems to me that I wanted, with a very strong feeling, right from the beginning, when we decided to settle down to have a home of our own. I was determined not to have an apartment, but to have a home, a private home. Now, consciously, I've always argued that I like my private home because we don't have to worry if we have a party or if we yell. We never have anything to worry about; we have the privacy of our home. Also, I like the idea that we have our own entrance. I like it because you don't smell the cooking. In the most modern apartment houses that I have visited, I'm always aware that there are so many other people living there; you get the food odors, or you can hear people talking next door. I've been in some $400-a-month apartments where next door you could hear laughing or coughing or talking. You see? And I could never have any privacy that way. I felt that family privacy is very important, and this, no doubt reflects—and yet, when I lived in an apartment, even as a teen-ager, I never seemed to think this way; I didn't care one way or the other. But, I guess, in facing every possibility, there is the possibility of having been frightened as a child, perhaps at Don's age, by sounds of my parents' bedroom. Now again, I say, consciously, I don't remember any such thing, but from my reading, I guess I wouldn't—this is blocked out. But do you remember my telling you of an episode in a motel in Reading?

Dr: Yes, I do. I remember it very well.

Pt: Where there was a door separating my room from the next room, which was locked. They open it when people want to use the two rooms together, you see. And in this next room you could hear everything almost as though they were right in your own room. And this couple was engaged in sexual intercourse. Do you remember me telling you of my reaction? This was the winter of 1955. This couple was having intercourse. Now, they were an older couple. They were about—I would make a rough guess—in the middle or late forties, so that chronologically there's almost the same difference in age between myself and that couple and myself as a five-, or six-, or a four-year-old and my parents. *I was tremendously excited by this couple next door; the sounds and the visions that I sort of put together and so on. I could hardly sleep that whole night; I remember I was extremely agitated.* Now this is getting to the, ah, analysis—well, unconscious material. I'd like to ask, parenthetically, so to speak, if an average, well-adjusted man was in the one room, and he was subjected to the same set-up that I was subjected to: Would he feel "nothing?" That's a loaded question, I know, but I would like to know the answer to that. I think it might—

Dr. I don't know of any data.

Pt: Well, of course, there's no data, but I'm sure you must have an opinion.

Dr: Well, it would all depend on the type of feeling you had. From the way you describe it, you were not only sexually excited by it, which is understandable—

Pt: But disturbed by it.

Dr: You were disturbed. That I think—

Pt: Yes, disturbed in this sense—now this is important—that I could not participate. Now that's exactly as a child would feel, wouldn't he? If he were to see his parents in such a situation?

Dr: Well, I wouldn't say that was exactly—

Pt: Well, from what I read in the book by English and Pearson, they seem to indicate that it was a strong possibility.

Dr: Yes, but again, I don't think we have enough data, except indirectly.

Pt: Well, haven't you noticed? I know I've noticed many times, in my own family, and I've seen it in other families as well, where the mother and father kiss, if there's an older boy around—I've seen it more with boys than with girls—he'll always run to the two of them and sort of take them both in, like he wanted to be in on the whole thing.

Dr: Yes, or try to separate them, either one or the other.

Pt: Yes, but most times they don't try to separate them, although they may want to. I think they might want to, they may want to, separate them, because they always do sort of wedge themselves in between—

Dr: Yes, they wedge in between.

(*New Session*)

Dr: Today is Friday, January 31st.

Pt: When I left here Wednesday, I left with a feeling that I never had after leaving a session. From the very day that I began, as I said, there were many times when I left with a feeling of accomplishment, lift, I had gained something, or a little more light had been shed on this; a few more layers were taken away, and so on. But this time when I left Wednesday, I felt, for the very first time, not just a lift; a lift is too superficial. The expression "a lift," itself seems to indicate something that's just a little temporary. But this time when I left, it wasn't just a lift; it was a release. I felt as though: At last I'm out of jail I felt as though all kinds of shackles had been broken, all kinds of gates had been opened, all kinds of light had come in; and not only did I think it, but I acted it, and not on purpose, but automatically. It carried over into my life at home. It carried over into the reaction almost—now this is going to sound kind of ridiculous because I have to think about it. I think—now wait a minute—there is so much you can do and the rest takes time, but I would honestly say that almost immediately—it began, mind you, the night after the LSD session. The change I'm referring to was the change in the relationship, consciously—now I'll speak on a conscious level—between Don and myself. It changed almost immediately and got better and better. It is so wonderful to smile at Don again. It is so wonderful to see him do little things that give me pleasure, instead of my constantly looking for things to tear down. *And one of the biggest thoughts I had was this: I am now free to love my wife because I no longer—the word "long" got in there, too—I no longer fear having loved my mother. And for the very first time—this, to me, is really something—for the very first time I can say now to myself that I loved my mother.* Now, I love her, I think, for the first time in my life in a very healthy, adult way, because as the result of analysis I more or less built up a sort of tolerance for my mother. And I understood my mother a lot better than I did previously. Therefore, it wasn't as pained, it wasn't as defensive, as before. But still this indicated a pressure, the fact that I had to tolerate, the fact that I had to constantly try to understand this and that. When I left here, in going over in my mind all that I had discussed; the discussions of my sexual feelings towards my mother and my father and myself, and how they were so mixed up and thwarted and misdirected. As a parent now, myself, and as you pointed out to me—you said, "Try to keep in mind what Don must be going through and he doesn't understand what he's going through. He couldn't even begin to understand what he's going through." Not only do I have to realize what has come about through my working out this phase of my life, but I must also realize how I have worked out my reaction to what Don is going through simultaneously. And Wednesday night, when I went to bed with my wife, I think it was easily compared to a belated, a twelve-year-belated, wedding night. I have found that I have been extremely buoyant; it hasn't subsided. I imagine, there will be times when the stresses will come up again, but I notice I have been, I have smiled more; just smiled, you know, not waiting for something to laugh at; but I have smiled more since

Wednesday than I have in months. I wonder if in part a, little things like—remember, I mentioned to you that I saw a little nick in the furniture?

Dr: Yes.

Pt: Without becoming upset by it; it's just that I saw it for the first time. And, also, those little paper dolls on my son's wall, you know; they've been there all the time and I never even noticed them. Certainly, I must have seen them; I just never noticed them. And now it seems like a lot of things are coming up that way, things that have been there all the time; and I didn't notice them because so much of this preöccupation with self has become removed, so it seems to me. Funny, only a few weeks ago I saw nothing but black in my past with regard to my professional status and my life. I figured, well, it'll go on and on, and all of a sudden there has become such a sense of optimism that I haven't known—I mean a real one. I've kidded myself and said, "Well, this is going to be great!" But this is the first time I have developed a sense of optimism, with also keen perspective regarding the obstacles that are still there and the conditions which still exist. Now, when was it? Wednesday, after I left there, I went up to the office to have a brief chat with one of the men there about some details of a new job. And I was just going to walk out because the place was empty. They had all gone to lunch. One fellow, Phil, had to stay in because he was expecting a client in about half an hour. He was sitting around and I went in during that half hour and I think I took more advantage of that half hour with Phil than I had in all the weeks that I've been going up there and really accomplishing nothing. I did something which I would never do before. Now, I know Phil well. He is a very young fellow. He's the one I told you went in as an office boy.

Dr: Yes, 28-years-old.

Pt: But for a 28-year-old to be head of the department, which he was just made; this is fantastic! He came in as an office boy! He's a real "What-Makes-Sammy-Run," with only one big difference; and that is, that during the last two years he has been going through analysis and it's taking; because while he's still the runner, you know, he has learned methods of pausing, of reflecting, unwinding, and so on. His marriage was saved—his marriage was completely through. His wife is going through analysis, and it's a wonderful thing. Anyway, I had a talk with him, and I was there for one reason; I wanted to talk about me. I didn't want to go up there to say how great this project was, or how wonderful this guy was, and so on; I wanted to talk about me. And so I did it in this way: He was showing me a new gimmick that was devised and that they are thinking of promoting. I knew he had only half an hour, and I had about an hour, and I'd like to make this half hour pay off. So, I didn't cut him short. He was talking to me and telling me about this new gadget, and then I said to myself, "As soon as I possibly can, I have to find the right place to jump in and get a hold of this thing and steer it away from him without hurting him, because he's in the middle of his pitch." And this I did. And within minutes he was extremely interested in what I was discussing. Now this, I think, is not the narcissism of which I've been accused, and I think justly now; this was realistic. I think this was a right, that I had to take advantage of a limited amount of time in a constructive way, because I did not destroy him in any way, you know; I didn't hurt his feelings. I didn't cut him short, and at the same time I know when I left, he was so enthusiastic about seeing me, he said, "For Christ's sake, let's get together and talk like this. Gee, we've been missing each other," and so on and so forth. I said, "Wonderful, we'll have lunch sometime"; and then he said, "Well, lunch is funny because my lunch periods fluctuate so much. But it won't hurt to check with my secretary; maybe we can get a lunch together." I said, "Well, then, I'll do that. We'll have that lunch." And I left feeling that I had accomplished a great deal. Nothing in dollars and cents, black and white, but he did make two very important telephone calls with regard to my work. Did I mention that? The possibility of doing some work for ——— Company?

Dr: Yes, you mentioned something about it.

Pt: That's all on the good side—Oh, there's lots more. I don't know where the hell to grab hold of it.

My, my preoccupation, sexually, getting back to that—with symbols—we spoke about this Wednesday. I think that I understand so well now that, symbolically, the big voluptuous type of woman could always excite me; and yet there never could be, I realize now, or there never could have been, a fulfillment in any way. It would always have to be: Let's keep it right there. Also, it indicated why I married a woman built like my wife. I don't think that was an accident, although now, as you probably know, I've known my wife since I'm 14 years old. But the only women that I was physically involved with, prior to marriage, were very slim. And now more than ever, it's of no importance. I'm not going to say that this type of women couldn't arouse me again, but I think it would be what is known as a different ball game. Now this is all the plus. Wednesday night we, my wife and I, must have talked until about four in the morning. We just went on and on. She knew, she saw—I mean, she wasn't blind—she saw this tremendous thing, this lift, this buoyancy. I was in love with her! It was the strangest thing, the strangest thing meaning, after all these years. I've always loved her, but many times I'd go through periods when I didn't love her; I wasn't in love with her and I wasn't out of love; I was nothing. It was as if I was just— you know—nothing. I remember, many times my wife would ask me, "Well, what do you feel about your mother?" Because sometimes she'd think that my mother would still get me upset, and I would say, "To tell you the truth"—and I've said it here many times—"I don't feel anything." And this is impossible with some one that's that close. You can't feel "nothing." You've either got to feel hostility or affection. It's one or the other.

Dr: One *or* the other?

Pt: Well, one and the other, but certainly not "nothing," you see. It's either one or the other, both; well, naturally, they're parallel, so to speak. But, now, it wasn't "nothing," and I suddenly felt that, Jesus! I haven't seen my mother now in about six weeks. But there wasn't a need to see her, like a feeling of guilt. For the very first time, I said, "It's really not right," but not out of guilt. I can't fortify that with words. It seems like there's a sudden reappearance of a feeling that I should have had a long time ago, and I must have stuffed down in my ankles somewhere. You know what I mean? And now I've permitted it to come out. And I was passing the theater and I remember her saying just a few days ago—I was talking to her on the telephone—that she wanted to see "Around the World in Eighty Days." And every time she passes this theater—she can only go on either a Friday or a Saturday night, and they are booked up four or five weeks ahead, and she's afraid to buy tickets for that time because she may not be well on that day (laughter). So I went in and bought two tickets for Friday, next Friday night, and I'm going to send them to her. I'm bringing my brother's car—I told you I had my brother's car about two months now while he was ill. I'm bringing it home to him tomorrow. So I figured that we would talk over there and visit.

Now in this big talking spree we went on I committed a cardinal sin.

Dr: You mean talking with your wife?

Pt: Yes, I committed a big sin. I guess you could guess what it was. There was one thing you have, from the beginning of my analysis warned me against, and that was discussing the inner part of the analysis with my wife. You said, "It's perfectly all right to deal with some of the realistic problems you have that you find you can solve through discussing them with your wife; some of the things you found out in your analysis, or, some superficial things here and there." But you again and again warned me never to get into any deep discussions. Just benefit by what you have; use it for yourself; carry it over to your family and your life and be happy with that. Well, we had this big talking spree and she was very happy; she seemed to reflect a lot of what I felt, you see. And we started talking about impressions of girl friends, of girls that she knew, we all knew. And we went back, and just in a conscious conversational level, you know; things we've discussed before in the past, but now in a different way. And after the discussion, I went to sleep. And all day yesterday, all of a sudden, she wasn't feeling so well. She started to get in this little—not a depression, but there was a little—the wall was up again. I said to myself—the first thing that hit me was: I shouldn't have told her.

Dr: Told her what?

Pt: Well, I'll get to that. I shouldn't have spoken. I got carried away, you see. I shouldn't have spoken like that; she wasn't ready to hear it. And then I said to myself: In the rest of my life, I could just as well not have said that to her. I said: Well, why did I say it to her? Although, certainly, at the time I said it, there was no conscious motive. It was this: Very fortunately, many times when she was hurt about something I said or did or that I didn't know I said, she'd let it lie for weeks. And it would build and build, and she would let it fester, until finally one day it would come up, you know. And the real thing would come out that happened three weeks before. I used to tell her again and again, "Tell me right away about these things, if you disagree; right then and there—tell me. Now, don't let it lie." But you know, one thing was conscious and one thing was unconscious. But this time, luckily, it only took about 12 hours for her to come out and say it. And I'm glad, I'm very glad, because at that discussion I think we fixed it up; but I learned though. It was this; and this is strange too. Christ, we can go on (laughter): She says to me—and I don't doubt that she said this. It was near four in the morning and we had seen the show "West Side Story" that night; the Leonard Bernstein thing; the musical. Have you heard of it at all? That's that Romeo and Juliet story. It's a fantastic thing. Well, we saw it, and it was one of the greatest things we have ever seen; the first show, by the way, I have ever seen where I thought of buying tickets again and seeing it another time. Oh, I've enjoyed shows, but I have never been so moved, and I want to buy tickets to see it again; That's how great it was. My wife felt the same way. So during that late hour we were talking about what kind of woman I would have wanted at that age and what kind of fellow she was looking for, because in her family—. It was a real two-way discussion. And then she said yesterday—I'm trying to quote her now—"Then there's a good possibility that had you met, had you married, someone else, you might not have had asthma." And I was supposed to have said—and I say this with all honesty— I don't remember this, I actually don't—she said that I said, "Well, it's possible." And in my wildest dreams I couldn't image saying a thing like this, because my asthma was there, that I knew of when I was 16 years old, you see. So, I thought one of two things: either I was half asleep and I only half heard her, or it might have been possible that what I thought she said was, "If you married another girl, you would have asthma too?" Because "wouldn't" and "would" in a conversation at four in the morning, when you're tired —although there's a big difference, but I can honestly think I could have misheard, otherwise I have no understanding of what could have made me say such a thing. And this is what tightened it up. She said, "I know it's sick of me and I know it's immature of me, and I couldn't love you more than I do now and I did at that time, but for some reason or other the girlishness in me wanted that reassurance, and you slapped me down with that." Oh, another thing she resented: She says, "Are my feelings going to have to depend so completely upon yours? In other words, here I was so unhappy to see you so unhappy." She understood enough about herself to realize it reflected some of her guilt, and maybe she's causing all of it. Then all of a sudden when I got this lift, she got the lift. Then all of a sudden with this one little thing, this one little remark—and again, I say I don't doubt that she heard this, and that I said it, but I can only say that I must have misheard her. I didn't even know what the hell I was saying, I don't know.

Dr. I'm going to interrupt you for a moment. I feel that your wife may have believed that that was the remark. I feel though—

Pt: Because of some of her feelings at the time?

Dr: The whole tenor of the conversation, as you describe it, was bordering a little bit on the dangerous side.

Pt: Oh, yes, I said that—

Dr.: And your remark was inconsequential, but it was the whole relationship there which depressed her. Because it's quite conceivable that if you had married someone else, you might not have had severe asthma. But that would have nothing to do with what you told her.

Pt: Of course, and I explained that to her.

Dr: Yes.

Pt: And she understands that.

Dr: So I do feel that there are other factors involved.

Pt: But it taught me a very, very valuable lesson. I realized there is no need, there's absolutely no need at all to discuss these with her; it doesn't matter. It's what I do from now on that counts.

Dr: That's correct.

Pt: And how I can benefit and use it unconsciously, for the most part. I don't think it's good if I have to stop and figure out my motivations in advance.

Dr: Well, I will say this: that if at times you appear to be ineffective or a decision is difficult, then you might explore the presence of a possible maladaptation.

Pt: Yes, yes. But for the most part, I notice there's a difference in my behavior every minute of the day. I just thought of something this morning that I thought was fantastic. I've always heard of Leonard Bernstein and what a genius he is, how brilliant he is. And yet for some reason—and I have no real reason for disagreeing because I'm no authority and have no right to disagree; it was just an opinion—I used to think he was very overrated. And when I saw the show "West Side Story," for which he wrote the music, I came away saying, "This man is from another planet! He's a genius, the likes of which we haven't seen on the music scene, perhaps never, or perhaps since the days of Beethoven, Brahms, Liszt, and so on. Not only is he a sensitive composer, you know—he wrote symphonies and concertos—but he also writes musicals, which is in a different field entirely. He has some dance sequences there that are the wildest modern jazz sounds you could ever get. And you'll hear this symphony, one and two, and it's of a strict classical nature, with a modern sound, you see. Not only that, he's one of the greatest lecturers; he's done more for classical music with children. He says, "I don't believe in making classical music sugar-coated, because that shows that under the sugar-coating there may be some distastful stuff. Let's just take the music for what it is and educate the children to that music; and start right off with a complete symphony, with a complete concerto. Don't give them a story that he wrote it when he was sick, and he was lying in bed." And obviously he's right, because he's drawing crowds of children and teachers to his concerts. There's never been such interest. And you've heard what a success his television things have been. It's fantastic! He hums a song, and he runs over to the piano and demonstrates and then conducts. He's a great show; he's great everything. And this to me was very important, because I was able to accept the genius of another person, a contemporary, you see. It was a turnabout for me. For no reason, I mean, I had the negative attitude. It was just a stupid child-like reaction. And that was it!

Dr: How about modern art?

Pt: Well, modern art; I accept that as I accept the sack dress.

Dr: Fashion.

Pt: A fashion.

Dr: Well, are you still hostile toward it?

Pt: I don't like it, but I'm not as hostile toward it. I'm resigned to it. I know it's there. I don't think it'll completely fade, but I think it will modify itself, in time.

Dr: Because I thought your attitude toward modern art was a bit overdeveloped—your hostility toward it.

Pt: Well, I'll be very honest with you. I don't think modern art is of importance to me now; it isn't as magnified as before. As a matter of fact, I think now that you mention it, I still believe in a lot of my theories with regard to what I would have to do to get into my own business. But I think—

Dr: Yes, but if you had your own business, you would have to have realistic attitudes toward the different things which are in fashion.

Pt: Yes.

Dr: And you couldn't say, "I won't do this because I don't like it."

Pt: Yes, and I've been looking at ads now for different art schools, different teachers; oh, a million and one things. I've just reached a whole new life.

Dr: Would you like to listen to these tapes again sometime? Or do you think we'd better leave well enough alone? I'll have them transcribed at some time if you want to read the transcription.

Pt: I remember how interesting it was to read the transcription of my first LSD session.

Dr: Sometime I may want your permission to publish this.

Pt: I wondered, for a while, I said "Gee, everything with Don and and me is going so great," because Don actually was reacting to this.

I knew I had a road in front of me to try to repair some of this, win back his confidence, try to erase a little bit of the fear, you know. Fear there'll always be, I guess; but I mean, some of the exaggerated fear because of my exaggerated feelings. So then I said, "But what happens if he's just a normal kid?" It's like doing something—I'm still capable of getting angry and wanting to enforce a little discipline, and so on. I said, "I wonder what will happen if such a thing should turn up?" And sure enough, last night, he started. If I were to satirize the situation, it seems as though he was saying, "Let me give it another try. Let's see, I haven't been able to get him lately. Let me see if I can just get—." So he went back to one of his old little tricks again, the going-to-sleep routine. And I became firm with him, but there was such a different sound, and even as I spoke, it was as though I was listening to myself from somewhere else. At the same time, I was listening with another speaker, so to speak. I said, "Now, look, Don, you have to get up early in the morning for school, and the longer you delay going to sleep—you're going to be tired. You know how you feel in the morning." And you know, he was getting so anxious about perhaps being late for school—my wife would wait—he'd have to leave the house at 8:30. You see, up until last week, he went in the afternoon. My wife would plan to wake him up about 7:45. She would get up at 7:30, get a few things ready, and then at 7:45 would plan—but never did that happen, because he would be up at 6:30 to make sure that he wasn't late for school. Last night I said to him, "Look, you know Mommy's going to wake you up at the right time. She always does. She's right there. We have the alarm, we have the radio alarm," and so on and so forth. "All you do is just go to sleep and have a good sleep, and Mommy will wake you up, and she'll get you to school in plenty of time." This morning, for the first time, my wife had to wake him up. Now, this is—well, what can I say—this is such a reaction that you almost would think, well, there must be some coincidence involved, too. But yet I can't help but feel something took, because this is the first morning in all of the weeks that my wife got up and walked over to him and just gently got him up.

Dr: Well, I'm sorry we have to stop now but I'm very glad that you've had all these good results out of the really painful revelations of the LSD session.

Pt: And yet as I said, as I was saying: Under LSD there was a feeling of gagging and a bitter pill to swallow; expressions like that. But yet when it was over, there wasn't the memory. Let me put it this way: There didn't seem to be the memory of a painful experience because the good feeling I had far outshone the—

Dr: Well, I can see that.

Pt: —pain, you see. And then the next visit, Wednesday, for the first time seemed to top it, but it, more or less for the first time, was a climax rather than an anticlimax. And it seemed to crystallize everything so brightly and clearly.

(*End of Verbatim Recording*)

C. DISCUSSION

The foregoing data represent a psychosynthesis of unconscious and realistic material supporting the view that LSD is useful as an adjuvant in psychotherapy. But this question remains: How long did the improvement in the patient's relations with his family last? Fortunately, data are available. The patient returned February 10th, 1958, 10 days after his last session. He stated that he had had a "real wedding night." Moreover, the patient's drop in professional status did not bother him to the same extent. He remarked, with insight into the dangers ahead, "Now I must find a palatable way to share my new feelings with my wife." He reported that his son was now sleeping through the night, was eating breakfast, and that he was establishing an excellent relationship with him. His wife also appeared to be pleased with the improved situation, and was reading "The Patient Speaks" (6) in a further effort to understand some of her difficulties with her mother.

On February 12th, 1958, Jack pointed out to the therapist that his son was intimidating him, but that he, himself, did not react in his usual hostile way. At this time, however, a danger signal arose. Jack's wife, who had some years before been hospitalized and had received shock therapy for a reactive depression, now "felt weaker" and "showed a little suggestion of hysteria during sexual intercourse." Jack felt, however, that ever since the last LSD session, he no longer had the same need to satisfy himself in regard to his masculinity, and that in his sexual activity, he had reached his highest point. He stated, perhaps prophetically, "Although there has been better sexual intercourse, as far as my wife and I are concerned, than there had been in our whole married life, the change in the relationship might force my wife into a feminine role which might be unpalatable to her."

On March 10th, 1958, Jack reported that his new confident, aggressive self, with all of the positive improvements in him, was interpreted as a threat by his wife. She told him, "You make me feel as if you were an imposter." She began to get shy, and stated that her feelings were like a pendulum and that her belief in herself was shaken. She said, that although she realized that what had happened to her husband was good for their marriage, she felt that she had to go back into psychotherapy. She started to see her former analyst five times weekly, although she had given up psychotherapy one year before.

Jack came into the office on March 11th, 1958, with the following dream.

> I was on a ship that had something to do with the advertising field. Something was leading up to something; there was a door leading to something. There was a feeling that I had to go through that door.

> There were metallic deck plates, and there was a flame in a space. It was a bright blue flame that constantly burned with 60 jets. I hesitated to cross the threshold for fear of burning myself, because the flames were in the opening—I did not cross.

Thus, the unconscious conflicts in Jack were renewed by his wife's rejection. Because Jack's wife had gone into therapy, the extra financial burden prevented him, temporarily, from continuing therapy with the writer. This also fit in with the wife's goals. Jack's relationship with his son began to deteriorate.

During the summer of 1958 (six months after therapy with LSD) the patient was seen several times. An attempt by the therapist to persuade the patient that his difficulties with his son involved his wife's rejection of him as an aggressive, masculine person, failed. It was as if the patient deliberately chose to subordinate his own drives for the sake of peace with his wife. As a result of Jack's subordinate position the cold war with his wife continued, with his wife, however, controlling the "bright blue flame with 60 jets."

The patient was not seen again until April, 1959, when the data of the previous year were again recapitulated, and problems connected with his son were discussed. One item which the patient omitted during the previous year, was that his wife's mother had been living with them all along. Jack denied that this omission was significant. His relationship with his wife continued to be stressful. He attempted, at times, to play a less subordinate role. This led his wife to threaten the integrity of the family by stating, "I don't know how long I can put up with this. I can't take much more." These remarks were not specifically related to anything in particular.

The foregoing data emphasize the complicated structure of the family hierarchy, when the head of the family becomes successful. At the beginning of Jack's analysis, his wife came in for an interview. Her criticisms of him were along the most trivial lines, and his extraordinary success at an early age was overlooked. The realistic problems faced by Jack, during his successful emergence from a pre-analytic to a more mature post-analytic frame of reference, are to be found, as mentioned, in the family hierarchy; in this case, a wife who could neither readily accept her husband's financial success, nor his transformation into a more mature, masculine person.

Several interviews during the past year (1960), have disclosed that Jack's success in business, although fluctuating, is definitely increasing. He stated that his hostility toward his wife was in a different direction than in the past. It was now, he believed, derived from weaknesses in himself, which he knew she recognized and took advantage of, and which were reflected in his conversations with her. His hostility was aroused with the knowledge that she was using his weaknesses to achieve her own narcissistic goals. His wife began to exert pressure on him to have her mother join them in a move to another state.

Although Jack, following repeated discussions with the therapist, is attempting to establish a stronger position in the family hierarchy, the wife's psychotherapy has not enabled her to accept her husband as the head of the household. She and her mother have formed a quasi-invincible barrier against domination by a male having Jack's dependency needs. If Jack's interests expand and he becomes more successful, his experiences (both with and without LSD in the framework of psychotherapy), in the opinion of the writer, have enabled him to adapt more effectively to extraordinary stresses faced in the home and in the outside world.

1. *Counter-Identification and the Cronus Complex*

In previous reports (5, 6) it has been pointed out that the notion that allergic symptoms are incited or even induced primarily by maternal rejection, should be replaced by another more logical psychodynamic process. It was held that the allergic child rather than being rejected by the mother or surrogate parent is rather introjected by a process of maternal engulfment. Both parent and child obtain neurotic satisfaction through this usually destructive symbiotic relationship. The emotional complications resulting from pathological engulfment of the allergic child by the parent was termed the *Cronus Complex*. How does the counter-identification process psychodynamically fit in with the Cronus Complex? I believe that one of the most important parts of the Cronus Complex leading to difficulties is the regression of the parent to the psychosexual level of the developing child, as illustrated by the foregoing data. The parent being intimately in contact with the child's psychosexual development is over-sensitive in those areas, himself.

The child passes through the complex psychodynamic processing of the oral phase, the anal sadistic phase, genital organization, Oedipus and castration complexes, periods of sexual latency, puberty and adolescence. All of these must proceed in the child in a complicated transaction with his parents and siblings. The parents (especially the one of the same sex), perforce, re-enact these emotional trials within themselves, not only consciously, but more important, unconsciously. No parent is without unresolved conflicts incidental to dysfunction in his own psychosexual development. Therefore, the process of development in an essentially normal child may suddenly and unexpectedly lead to anxiety in his parent by triggering the parent's own conflicts (counter-identification). This is apt to be more intense where the Cronus Complex leads to psychologic vectors of introjection beyond the normal. The pathological counter-identification by the parent may be slight if the parent's neurotic framework with special reference to his child's normal developmental phase is localized and fairly specific. When the counter-identification is distorted, normal family relationships may be inexplicably disturbed. Perhaps the most common examples are to be observed in the reaction of parents during the toilet training of their children and during the adolescent period of their daughters when courtship by the male begins. The comparative serenity of most parents during the latent periods of their children's development should be borne out by studies if our theory is correct.

When the counter-identification process is distorted, then the guilty fears of the parent are projected suddenly, not only toward the child in question, but are spread throughout the family hierarchy, with the emergence of other psychological manifestations in the parent and/or unconscious, e.g., hostility, depression, anxiety attacks, etc., of unknown origins. Somatic manifestations may also be present. It must be re-emphasized that the child's development may be essentially normal, and that our concept deals with the dysfunction of the parent's adaptation process that leads to the development of characterological disorders. A good many of the post partum depressions may be due, not to a non-specific "immaturity" for example, but may be caused by counter-identification with the (introjected) child, who engenders regressive forces within the parent, interfering with the normal maternal instinct. It would be of interest to study a series of women with post partum depressions for specific conflicts in the oral and/or anal periods. In other words, it is proposed here that it is not the need for a career by the mother, but rather the presence of pregenital conflicts suddenly fired by the introjected newborn infant. This is one of the extreme examples of counter-identification.

Needless to say, a vicious cycle may ensue eventually leading to neurosis in the primarily healthy child, itself. Thus, "the sins of the fathers are carried unto the children" in varying degrees and understandable replication through the generations.

For example, the following brief case reports will illustrate the technique of employing the principle of counter-identification in analyzing the psychodynamics of certain case records.

> Case 1. A 50-year-old woman, with a degree in a profession generally considered as masculine, became very depressed during the psychoanalysis of her daughter. It soon became apparent that whenever the daughter showed evidence of homosexuality by her dress or attitude,

the mother became depressed. When the daughter showed feminine traits, the mother was elated far beyond the level of pleasure that ordinarily should have been anticipated. That is, if the daughter acted as a normal girl in our culture, the mother became elated; when the daughter acted with masculine traits, the mother became depressed. I believe that in this patient's case, the acute depression of the mother, connected with homosexual trends in the daughter, triggered unresolved homosexual conflicts in the mother, herself. By understanding the psychological mechanisms similar to this, the mother was able to realistically appraise the fact that her daughter was in therapy, attempting to become a more mature member of society.

Case 2. A 40-year-old woman became both agitated and depressed as the responsibilities of taking care of her two young children, especially the younger, mounted. One of her main objections to her friends was that they told dirty stories. Four-letter words were anathema even when used by her husband under the most intimate circumstances. This patient, it is believed, was inwardly unable to tolerate the excretory and instinctual manifestations of young children, although outwardly, she performed her tasks well and efficiently. She had led an extraordinarily pasteurized existence in the sexual area prior to marriage, and during the entire period of adolescence and maturity no physical (sexual) contact with men occurred, even though there was constant social contact with men and she was always being courted. The presence of young children and counter-identification with their instinctual drives could result in the agitated depression manifested by this patient.

Case 3. A 40-year-old woman, married, with two children, became agitated and depressed as her oldest daughter approached adolescence. It soon became apparent that she was re-living her own adolescence with the sexual fears of that period. These were especially catalyzed by an attempted seduction by her own father when she was 15 years old. This patient had counter-identified with her adolescent daughter, and she had regressed to her daughter's level of psychosexual development. There were lengthy discussions of homosexuality, sexual premarital relationships during adolescence, and other topics which all fitted in with her own stormy psychosexual development.

In general, whenever a parent becomes overconcerned with what is a normal part of a child's psychosexual development, it is wise to look for problem areas in the parent which correspond to the period of the development of the child. In this way, insight into the nature of the parent's problem is more rapidly achieved and a better relationship in the parent-child constellation is more readily brought about by counseling, with the avoidance of lengthy psychoanalytic procedures necesary in the cases given verbatim (Jack C.).

D. SUMMARY

In keeping with previous data, LSD may be used as an adjuvant to psychotherapy. LSD produces an elated state (hebesynthesis) which lasts several hours. The reconstructive potential and integrative functions of the ego under these doses of LSD provide insight into conflict situations not hitherto as readily accessible to the patient. In this study, LSD was given to a male patient, 34 years of age, who had had approximately 500 hours of psychoanalysis. As a result of his psychoanalysis, he understood many of the mechanisms of his difficulties of adaptation. However, following the birth of a second son, he became uncontrollably irritable with his older son. During many weeks of discussion, no progress was made toward solving this problem. For example, he spoke with great emotion of the "rendezvous" of his older son with his wife when the child "visited" her during the night. LSD had been administered to this patient with success before. It was decided to give him LSD once again in an attempt to reactivate and reconstruct those conflicts responsible for his uncontrollable anger toward his older son.

The child passes through the complex psychodynamic processing of the oral phase, the anal sadistic phase, genital organization, Oedipus and castration complexes, periods of sexual latency, puberty and adolescence. All of these must proceed in the child in a complicated transaction with his parents and siblings. The parents (especially the one of the same sex), perforce, re-enact these emotional trials within themselves, not only consciously, but more important, unconsciously. No parent is without unresolved conflicts incidental to dysfunction in his own psychosexual development. Therefore, the process of development in an essentially normal child may suddenly and unexpectedly lead to anxiety in his parent by triggering the parent's own conflicts (counter-identification). This is apt to be more intense where the Cronus Complex leads to psychologic vectors of introjection beyond the normal. The pathological counter-identification by the parent may be slight if the parent's neurotic framework with special reference to his child's normal developmental phase is localized and fairly specific. When the counter-identification is distorted, normal family relationships may be inexplicably disturbed.

The verbatim recording of the LSD interview and the interviews immediately following the LSD session form the main body of the paper.

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ON THE HISTORY OF THE OBJECTIVE INVESTIGATION OF THE PROCESS OF PSYCHOTHERAPY*

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Investigations into psychotherapy can be oriented towards trying to find the answers to one of at least three questions, *viz.,* does psychotherapy work, why does it work, how does it work. Answers to the first question may be found in progress and outcome research, that is, does the patient improve, either in terms of how he was functioning before therapy, or in terms of progress towards aspects of some theoretical, generic goal of adjustment. This may be measured in terms of specific attitudes towards himself and/or others, or some overall, encompassing criterion of functioning. It might be investigated through a thorough social psychological study of the individual or, conceivably, by the ostensibly simple question: has the reason the person sought psychotherapy been dealt with to the satisfaction of both patient and therapist. The question as to why psychotherapy works would seem to be dependent upon a theory of psychotherapy, itself based upon a theory of personality. Pertinent to the possible answer to this question would be the data from research into the process of psychotherapy, as well as from research into the areas of general psychology, e.g., learning, motivation, perception, feeling, and thinking. Questions as to how psychotherapy works may be gleaned from process research. It is the attempts to derive answers to this latter question that will be the focus of this paper.

Psychotherapy may be viewed from the framework of social psychology. It deals with interpersonal relationships, either as formulated by Freud,[1] or more literally as conceived of by Rank,[2] or Sullivan (46). In that regard, all research that deals with the dynamics of any one-to-one interpersonal relationship, such as with hypnosis, non-clinical studies of attitude change,

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[1] "The first aim of the treatment consists in attaching him (the patient) to the treatment and to the person of the physician" (14, Vol. II, p. 360), and "Is it not then a justifiable endeavour on the part of the physician to seek to control this factor (the relationship of the patient to the physician), to use it with a purpose, and to direct and strengthen it? This and nothing else is what scientific psychotherapy proposes" (14, Vol. I, p. 251).

[2] As expressed in the writings of Taft (49), Allen (1), and Levy (29).

etc., are relevant for an understanding of psychotherapy. One can reason that all these are but special instances of the dyadic relationship, therefore the phenomena pertinent to one should be pertinent to the others. In addition, within the context of social psychology, psychotherapy may be viewed in terms of the communication process and communication theory.[3] Hence, experimental investigations into verbal interaction even in non-clinical settings, as those reviewed by Krasner (22), also become pertinent to attempts to understand the dynamics of psychotherapy.

Freud considered psychoanalysis both a means of treatment as well as a method to investigate hypotheses regarding personality, its characteristics and its development.[4] Yet in spite of the fact that there were voices being raised quite early to place psychoanalytic psychotherapy on a sound *experimental* basis,[5] there has been a paucity of relatively objective research into the process of psychoanalysis. Reviews of the research regarding experimental validation of psychoanalytic phenomena, such as by Rosenzweig (40), Sears (45), and Pumpian-Mindlin (35) do not contain references to investigations of the process of the psychoanalytic interview. The analysis of the individual case characterizes the traditional sort of research. One reason for this state of affairs was that although Freud did have a research orientation in his work, he counseled against note-taking during the hour itself. Freud felt that the concentrated efforts necessary for accurate recording of the data by the therapist would detract from his capacity to attend to the patient's communications in the manner suggested by Freud, a manner which was supposed to facilitate understanding the patient's communication.[6] Therefore, the data of the therapeutic hour consisted of the analyst's post facto recollections. As a means of helping the analyst understand what was really going on in the therapy, these data might be acceptable if not even advisable; as a source of reliable and valid information for an objective study of the therapeutic process, it was unsatisfactory.

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[3] "In psychotherapy . . . communication is used as a therapeutic tool" (42, p. 690); "Psychiatric therapy aims at improving the communication system of the patient . . . the psychotherapist aims at restoring a broken-down system of interpersonal communication on a semantic or interaction level . . . Regardless of the school of thought adhered to, or the technical terms used, the therapist's operations always occur in a social context. Implicitly, therefore, all therapists use communication as a method of influencing the patient" (43, p. 19), or "Communication is the rubric of the psychotherapeutic method. The psychotherapist is the expert in one-to-one communication and relies upon its devices to achieve his goals. Communication is so fundamental to the action of psychotherapy that I am herewith advancing the theory that movement and results in psychotherapy are largely dependent upon it more than any other factor" (17, p. 31).

[4] " . . . research and treatment proceed hand in hand . . . " (14, Vol. II, p. 326).

[5] Lowenstein, O. Is an experimental foundation of psychotherapy possible? In the abstracts and reports of the Fourth General Congress for Psychotherapy, April, 1929, as reported in the *Psychol. Abstr.*, 1929, **3**, 380.

[6] "Recommendations for physicians on the psycho-analytic method of treatment" (14, Vol. II, 323-333).

As early as 1929, Lasswell (24) recognized the need for a more adequate recording of the data of the analytic hour if it were to be useful for research. He suggested that the interview might be recorded either by a third person, an "invisible recorder," or a mechanical recording device. In subsequent articles (25, 26), he reported the use he had made of the electrically recorded verbatim data. Saul (44) indicated that for the purpose of training and research extensive record taking had been going on at the Chicago Institute for Psychoanalysis since about 1933. However, it fell to the lot of the psychologist, the counselor, rather than the psychoanalyst, to capitalize on the suggestions made by some of the psychoanalysts, and in 1939, Symonds (48) made the suggestion to the psychologists that phonographic recordings might provide the objective data for the study of the interview process. In 1942, Rogers (38) discussed the use to which such data might be put as regards training and research, and Covner, one of Rogers' students, wrote a series of articles (7, 8, 9) spelling out the details of the rationale and technique of phonographic recording. Subsequent research under the general supervision of Carl Rogers validated the assumptions regarding the use that could be made of verbatim data. Yet, discussion of the attempts to record data still find their way into current psychiatric literature, e.g., the articles by Redlich, *et al.* (37) and Brody, *et al.* (4). And parenthetically it might be noted that it was not until quite recently that anyone thought to empirically determine the effect of the factor of making recordings upon the patient and the course of the therapy. All data, however, e.g., Greenblatt, *et al.* (16), Lamb and Mahl (23), and Watson, *et al.* (50) suggest that recording devices have an observable but not deleterious effect upon the therapeutic interview.

Now that the data had been made public, so as to say, that is, available to the professional public, a second development appeared to be necessary. In order to conform to the rigors of the more objective approach characteristic of psychology, it was deemed necessary to translate the raw data into a form that could be amenable to statistical analyses. In 1938, Lasswell (27) devised a system of categorizing what the patient said during the psychoanalytic interview. He designed codifications for the patient's positive and negative attitudes towards himself, towards others, and towards the therapist. Porter (33, 34) developed a system, for the codification of what the therapist said, and Snyder (46) refined these categories, added categories regarding the statements made by the patient, and, in part, studied their interaction. Subsequent attempts to objectively describe the activity of the therapist have been made by such investigators as Keet (21),[7] Finesinger (12),[8] Carnes and Robinson (5),[9] Dittman (10),[10] Collier (6),[11] and Harway, *et al.* (19) and Raush, *et al.* (36).[12] Additional attempts to objectively describe the statements made by the patient have been offered by investigators such as Gottschalk and Hambidge (15),[13] Murray (31),[14] (32),[15] Auld and White (3),[16] and Leary and Gill (28).[17]

One of the earlier difficulties encountered in the wish to study the raw data of psychotherapy was the responsibility felt by the therapist regarding the confidentiality of the material and the sanctity of the hour. Quite early, Lasswell (25) attempted a solution to even this problem. He reasoned that the process of psychoanalysis could be validly reproduced even though one did not utilize a "real" patient. In that we all had an unconscious which could be made the object of analytic study, all that was necessary was that the basic characteristics of the analytic process be adhered to, *viz.,* the "patient" would free associate and the analyst would observe and make interpretive comments where appropriate. This technique did not seem to "catch on" with psychoanalysts, but did become the basis for a number of research endeavors by psychologists. One of the earliest to utilize this approach was Keet (21) who referred to his methodology as involving a "miniature counseling situation." Other attempts at utilizing a simulated therapeutic situation have been attempted by such investigators as Gottschalk and Hambidge (15), Grossman (18), Kanfer (20), Martin, *et al.* (30), and Rogers (39).

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[7] Who codified the statements of the therapist to differentiate between expressive and interpretive activity.

[8] Who graduated therapeutic activity into three levels of activity: low, moderate, and marked.

[9] Who classified therapeutic activity into clarifications, tentative analyses, interpretations, and urgings.

[10] Who classified therapist activity into question re feeling, reflecting feeling, clarifying feelings already expressed, clarifying feelings somewhat less surface, and depth interpretations.

[11] Who offered a continuum of activity level.

[12] Who offered a dimensional analysis of interpretive activity.

[13] Who codified the verbalizations with regard to formal (syntactical) aspects and content.

[14] Who codified the content of what the patient said into statements involving hostility or defenses.

[15] Who codified the content of what the patient said in terms of drives for sex, affection, dependence, and independence.

[16] Who categorized the patient's communications in terms of anxiety.

[17] Who categorized the patient's verbalizations with regard to level of awareness (consciousness) of ideas and affects.

Studies of the process of psychotherapy are becoming more numerous;[18] investigators are apparently waxing brave and daring to delve into an area still shrouded in no small amount of mystery, and one which almost seems to defy attempts at objective inquiry. Eysenck (11) dashed water on the fires of enthusiasm in this area by pointing out that the cold-blooded statistics suggested that psychotherapy might not work at all. Another factor has been simply deciding which of the processes of psychotherapy warranted or even lent itself to investigation: the psychoanalytic, the Rogerian, the Sullivanian, etc. Is it justified to study *a* process of psychotherapy, or are there as many process*es* as there are theories? Another apparent drawback to research in this area has been the element of controls, the difficulty in selecting comparable subjects and in comparing various therapies and therapists. Such a problem is the bane of the investigator interested in progress or outcome research, but it also becomes a problem in terms of analyzing the process data as well.

In spite of the many limitations to the attainment of the standards of adequate research methodology, experimental investigation of psychotherapy is progressing, because it must. The need for adequate and, if you will, efficient and effective methods of psychotherapeutic intervention is increasing by virtue of the number of people becoming aware of this avenue of help, and the degree to which it is being made available to more people. Moreover, if psychotherapy is indeed a valid method of the science of psychology (Frank, 13), then it behooves us as scientists to refine it into a technique which yields reliable and valid information, and one which is valid and reliable in terms of what is purported to be done with it.

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ESCAPE FROM FREEDOM REVISITED*

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The recent literature in philosophy, psychiatry, psychology, that which, in its broadest sense, deals with the nature of man, reflects increasing concern over the status of man in his world. Fromm (4) wrote about man's desire to escape from newfound freedom; Wheelis (5) writes about man's quest for his personal identity in a world devoid of the "verities" of life, and Existentialism characterizes 20th Century man in search of his lost self. The underlying premise for such ideas is that identity is based upon values which are absorbed from the social milieu in which man develops; following Fromm (4, p. 13) ". . . the . . . inclinations of man are not a part of a fixed and biologically given human nature, but result from the social process which creates man . . . Man's nature . . . (is) a cultural product . . . " It follows, therefore, that if the root of neurotic adjustment is related to a loss of identity, the cause may be ascribable to a society which no longer provides the necessary system of values upon which man might base his self picture. As man is conceived to be more a product of his external rather than his internal milieu, the origins of difficulties regarding man's psychological existence, then, may be attributable to inconsistancies, conflicts, and difficulties in the culture.

Freud's psychology has been criticized for being too biologically oriented and overemphasizing the intrapsychic determinants of behavior to the exclusion of the effects of cultural vectors. Originally, Freud did assume that the ego was merely an outgrowth of the id thereby confirming the ultrabiological orientation. However, with time, he modified this point of view so as to include what Hartmann, for instance, later was able to refer to as the conflict-free spheres of the ego, of the autonomous character of the ego processes and functions, that is, an ego formed and modified in the light of the reality with which it came in contact. The social-moral values of life were reflected in Freud's concept of the superego. Admittedly from the frame of reference of Freudian apologetics, therefore, it seems inaccurate to criticize Freud for a *complete* absence of awareness of the social context

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of man's psychological development. At worst, he may be seen to have been preoccupied with clarifying the principles regarding the intrapersonal aspects of man. The progress of the development of personality theory in the post-Freudian era does reflect an increasing emphasis on the context in which man develops. Ultimately, however, as is predictable from Hegelian dialecticism, the antithesis goes to the same degree of extremity as the thesis, but in the opposite direction. Now, such theorists who ascribe to the Frommian thesis may be criticized for a construction of man's personality out of the warp and woof of environment to the exclusion of his basic characteristics. The more accurate approximation of the source of man's personality most likely lies somewhere in between, that is, the Hegelian synthesis as is reflected in such a concept as Murphy's biosocialism. It is now no longer unique to consider psychological adjustment as characterized by a healthy, e.g., appropriate, balanced, relationship not only within the individual, but between the individual and his environment.

If the era of the Middle Ages may be described as a time when man seemed to be "enslaved" by his environment, the period that follows, that is, the Renaissance, the Reformation, the so-called Age of Reason, up to and including the modern era, may be characterized as one reflecting increasing respect for the individual irrespective of his social paranym (religious, socio-economic, political, national, etc.). At the same time, this period may be described as one in which the cultural values of life seem to be imposed from without in a less autocratic way. As the *strength* of the *provision* of these external guiding principles decreases, it has been reasoned that nothing has been supplied to replace the old, now discarded, philosophical absolutes. Man's lack of orientation in life, according to this schema, his disorientation in psychosocial space, his lack of or confusion in his basic identity, is attributed to the society in which he develops. However, in this light, the freedom that Fromm sees man escaping from is not freedom at all, but, rather, nothingness, a void.

Let us grant that contemporary society may provide less of the social woof authoritatively, or that the social context is less definitively outlined than previously. This still may not mean that responsibility for difficulty in adjustment ipso facto rests with society, at least to the extent emphasized by current philosophically-oriented scholars. If a person be sitting on a train which is, as yet, sitting in the station, it is easy for this person to view the scenery in the immediate field of vision. However, as the train begins to move, it becomes increasingly difficult to view the now passing scene; the eye and head must make accommodating movements in order to catch the desired view. If the visual mechanism is not capable of making these adaptive movements, the organism may indeed experience discomfort and lack a sense of stability. The question may be raised, however, as to whether the imbalance is due to the fact that the landscape is going by too fast, or that the neurophysiological mechanisms necessary to assist in the perceptual process are not functioning adequately. Obviously, if the train is going faster than one would expect the eye to be able to make the necessary adjustments, such an adaptation understandably will not be evident. If, however, the train moves at a pace to which one might expect this individual to adapt, it is justified to attribute this sense of disorientation to factors within the individual. By analogy, although it may be true that culture may seem less definitive and more fluid and flexible now than when socio-economic, political, religious dogma reigned supreme, the individual still should be able to adjust to what exists. Social values may be less authoritatively given, but are still available to those who seek them out or who are exposed to them so that they may be absorbed; the change in our society has not been to a void nor to a constantly changing kaleidoscope. Therefore, that individuals are experiencing discomfort at this somewhat indistinct scene, may well be because the difficulty still rests within them, i.e., intrapsychically. To reason through the analogy, if individuals were stable and secure within, the lack of an authoritarian superstructure should not lead to disorientation. If one were psychologically prepared to meet the exigencies of the life into which he has been born, his steps would not be expected to falter *to the point that he should fall.*

Psychological maturity, integration, health, etc., is that which enables the individual to at least face (though not necessarily resolve) the problems of life regardless of their variety. Hence, one may propose that a lack of psychological strength still lies at the basis of problems in psychosocial adjustment more so than the less authoritative social context in which one lives. Once again, it would appear we have returned to regard the individual, his motives, his attitudes, his personality characteristics as defining his psychosocial adjustment. As to *the* etiology of neurotic behavior, reason ought to tell us that with the individual conceived as a biosocial organism, both variables must be taken into consideration in order to understand behavior. These days, however, it is unfashionable to discuss the biological bases for psychological discomforts, primarily because these are usually viewed as being mutually exclusive with regard to aspects of one's social milieu, or factors which have been learned and, hence, can be modified. Yet recent research is drawing attention, once again, to the biological side of personality.

Indeed, Freud's original concept of the constitutional predisposition to neuroses (3) may not have been an erroneous assumption. The work of Cattell (1) and Eysenck (2), for example, suggest that the individual who becomes neurotic may be one who is predisposed to such a reaction by virtue of the functioning of his nervous system.

In essence, the problem may be seen to be an inability to abide in a world without having been forced-fed the social values. When they were dogma in social learning, it would appear that individuals were not as disillusioned or confused, at least to the extent that they seem to appear now. It has been reasoned that people seemed to be able to depend on existing institutions for support. Now that the social environ may not afford the rigid support of external crutches, one seems to see greater instance of psychologic collapse. The conclusion drawn here, however, is not that the world is in "bad shape," rather it is that the individual does not appear to have the inner strength to cope with his world. Inner strength comes from stability, and that, from security, apropriateness, balance, and integration within the personality. It is not the world that needs reshaping, but, rather, the modes of child development, the methods of rearing children so that they maintain their psychic equilibrium not in spite of their society but within their society.

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THE VALIDITY AND EQUIVALENCE OF TESTS OF SELF-ACCEPTANCE*

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A. INTRODUCTION

The concept of self-acceptance has achieved notable prominence in current personality research, and with its popularity there has been a corresponding interest in the development of measurement techniques. Raimy's (1948) classic measure of self-acceptance, involving the categorization of self-reference statements in client-centered therapy as positive, negative, or ambivalent, was followed by the Chicago *Q* sort (Butler and Haigh, 1954), introducing the now widely used model of a discrepancy between the self-concept and the concept of the ideal self as an index of self-acceptance. At about this time, Bills and his co-workers (Bills, Vance, and McLean, 1951) proposed an adjective rating scale incorporating the self-ideal discrepancy model as one of a set of scores obtained from their Index of Adjustment and Values (IAV).

These measurement procedures were derived from Rogers' (1951) personality theory and, among the many tests of self-acceptance, probably represent the clearest operational expression of the concept as it is found in this theory. A variety of other self-acceptance tests have been developed, employing different models and variants of the self-ideal discrepancy measure: a "positive self-concept" minus "negative self-concept" (Brownfain, 1952); adjective check lists (Buss and Gerjuoy, 1957; Gough, 1955; LaForge and Suczek, 1955); and self-rating scales using item weights (Berger, 1952; Phillips, 1951).

One major question in evaluating the considerable research on this variable concerns the extent to which the various tests can be considered to be equivalent measures of "self-acceptance." Of course, definitions of the construct may differ from one theory to another, and the interpretation of general research findings in this area must be concerned with divergence in theoretical definitions. But apart from these differences, there is an empirical problem of the interchangeability of the operational definitions of self-

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acceptance. Studies by Bills (1958), Omwake (1954), and Cowen (1956) found correlations varying from zero to .56 depending on the particular tests correlated. The low order of the correlations between some of the tests in these studies suggests the need to investigate more fully the equivalence of self-acceptance assessment operations.

A second and more crucial problem is concerned with the validity of self-acceptance tests. In addition to determining the equivalence of several current tests, this research was designed to assess their validity. Two validation procedures were followed. First, self-acceptance tests were subjected to an approximation of the correlational validation model recently proposed by Campbell and Fiske (1959). The second procedure involved an investigation of the construct validity of the tests selected. Phenomenologists hypothesize a relationship between self-acceptance and criteria of adjustment (Calvin and Holtzman, 1953; Rogers and Dymond, 1954). This hypothesis, however, has been criticized by Block and Thomas (1955), who showed that self-satisfaction may imply defensiveness and rigidity. A further test of this relationship was thus deemed appropriate. Also, it appears to be reasonable to expect a relationship between self-acceptance and dependency, low self-acceptance being associated with dependent responses. Accordingly, measures of adjustment and dependency were included.

B. Study I

1. *Method*

a. Tests. A number of tests employed in recent research on self-acceptance were selected, and an effort was made to include tests representing the three basic measurement models: self-ideal discrepancy measures, adjective check lists, and self-rating devices. Four tests were used from which six separate scores were calculated. These tests and the scores derived from them were as follows:

1. A modification of the Chicago *Q* sort, the Self-Acceptance (SA) questionnaire, previously employed in research by Crowne (1959). This measure employs the Chicago *Q* sort items and correlates highly ($r = .74$) with the *Q* sort. It requires much less time to administer and score than does the tedious *Q* sort. A self-ideal discrepancy score is calculated from this test.

2. IAV. Two of the three scores on this test were used in this study—the self-acceptance rating, which Bills designates as the major self-acceptance score, and a self-ideal discrepancy score. The "others" score on this test was not used. The IAV consists of 49 trait adjectives which are rated by *S* for self-concept, ideal-concept, and self-acceptance. Thus one score on this test was included in the self-ideal discrepancy class of measures and the other constituted the self-acceptance rating method.

3. Buss scale (Buss and Gerjuoy, 1957). This test consists of 16 groups of adjectives, the groups composed of eight adjectives each. The groups are relevant to various personality dimensions (verbal hostility, sexual attitudes, anxiety, mood, etc.). Adjectives within the groups were scaled for intensity and abnormality by psychologists, and weights are assigned to each word. The intensity weights were employed in self-acceptance scoring. The scale is filled out once for self and a second time for the ideal; the discrepancy score is the algebraic difference between the weights of the adjectives checked on the two administrations.

4. Gough Adjective Check List (ACL) (Gough, 1950; 1955; 1960). The ACL is composed of 300 adjectives and *S* simply checks those which he feels are self-descriptive. Two scores are obtained from this test: self-acceptance (SA) and self-criticality (SC). These express the ratio of the number of favorable (or unfavorable) adjectives checked by *S* to the total number of adjectives checked.

In order to determine the relations between the tests of self-acceptance and the variable of adjustment, the Incomplete Sentences Blank (ISB) (Rotter and Rafferty, 1950) was employed. The ISB was also scored for dependency according to a manual prepared by Rotter (1956). Finally, since previous research (Cowen and Tongas, 1959; Edwards and Horst, 1953; Kenny, 1956) has found substantial correlations between measures of social desirability and certain types of instruments employed to assess self-acceptance, it appeared desirable to include a social desirability measure in order to investigate the effects of this factor on a variety of self-acceptance tests. Edwards' (1957) SD scale was selected for this purpose.

b. Subjects. The *S*s in this study were 37 males and 42 females who were students in introductory psychology classes at The Ohio State University. Two males and one female had to be discarded in the analysis of the results due to their failure to provide scorable responses on one or more of the tests.

c. Procedure. The *S*s were administered the tests in groups of approximately 10, and the order of administration was arranged such that each test appeared at least once in every position. The ISB's were separately scored by an experienced rater for both maladjustment and dependency. Dependency scores are shown only for males since there are, at present, no scoring criteria for females.

2. *Results*

Pearson product-moment correlations were computed between the self-acceptance tests and between these measures and the three variables external to self-acceptance. The correlations are reported separately for males and females since, as shown in Table 1, sex differences significant at the .05 level or better were found between the means on four of the eight tests. Tables 2 and 3 present the intercorrelations for males and females of the self-acceptance tests and their relationships with the variables of adjustment, dependency, and social desirability. The signs of the correlations can be ignored, since they simply reflect the direction of scoring, and in no case were relationships contrary to expectation obtained.

TABLE 1
MEAN SEX DIFFERENCES ON THE SELF-ACCEPTANCE AND OTHER TESTS FOR 35 MALES AND 41 FEMALES

Test		Males	Females	*t*	*p*
SA questionnaire	M	87.69	77.46	1.34	NS
	SD	35.09	31.47		
IAV I-III	M	49.69	41.76	2.07	.05
	SD	18.88	14.51		
Buss scale	M	11.49	8.04	2.21	.05
	SD	6.53	6.51		
Gough SA	M	43.06	49.07	2.67	.01
	SD	10.62	9.11		
Gough SC	M	10.60	6.51	2.80	.01
	SD	6.93	5.83		
IAV II	M	165.26	171.46	1.11	NS
	SD	26.31	22.95		
SD	M	29.14	31.51	1.88	.10
	SD	5.78	5.19		
ISB maladjustment	M	126.34	122.58	.89	NS
	SD	18.40	18.27		

These tables were designed to provide a rough approximation of the multitrait-multimethod matrix proposed by Campbell and Fiske for assessing convergent validity. Instead of a convergent validity analysis of *several* means of measuring *several* variables (traits), however, the present data afford an assessment of the convergent validity of several tests, grouped according to measurement models, of the *same* variable—self-acceptance. The self-acceptance tests are arranged in groups of methods: self-ideal (S-I) discrepancy, adjective check list, and self-acceptance rating. Within each method block a type of test is found rather than a trait assessment as in

TABLE 2

INTERCORRELATIONS OF SIX SELF-ACCEPTANCE TESTS, REPRESENTING THREE MEASUREMENT MODELS, AND ADJUSTMENT, DEPENDENCY, AND SOCIAL DESIRABILITY SCORES FOR 35 MALES

	Methods							
	S-I Discrepancy			*Ajective Check List*		*Self-Rating*	*Adjust-ment*	*Depend-ency*
	1	2	3	1	2			
S-I Disc.								
1. SA	—							
2. IAV I-III	.57**	—						
3. Buss	.40*	.32	—					
Check List								
1. ACL SA	—.42*	—.35*	—.54**	—				
2. ACL SC	.44**	.34*	.65**	—.88**	—			
Self Rating								
IAV II	—.35*	—.85**	—.35*	.48**	—.51**	—		
Adjustment	.34*	.13	.43**	—.48**	.39*	—.20	—	
Dependency	.37*[a]	.29[a]	.22[b]	—.39*[a]	.20[a]	—.25[a]	.74**[a]	—
SD	—.54**	—.47**	—.56**	.45**	—.49**	.33	—.38	—.30[a]

* Significant at the .05 level.
** Significant at the .01 level.
[a] $N = 32$.
[b] $N = 30$.

TABLE 3

INTERCORRELATIONS OF SIX SELF-ACCEPTANCE TESTS, REPRESENTING THREE MEASUREMENT MODELS, AND ADJUSTMENT AND SOCIAL DESIRABILITY SCORES FOR 41 FEMALES

	Methods						
	S-I Discrepancy			*Adjective Check List*		*Self-Rating*	*Adjust-ment*
	1	2	3	1	2		
S-I Disc.							
1. SA	—						
2. IAV I-III	.65**	—					
3. Buss	.56**	.39	—				
Check List							
1. ACL SA	—.38	—.53**	—.41**	—			
2. ACL SC	.45**	.51**	.44**	—.90**	—		
Self Rating							
IAV II	—.58*	—.62**	—.18	.31	—.44**		
Adjustment	.42**	.21	.39*	—.34*	.32*	—.36*	
SD	—.57**	—.51**	—.53**	.58**	—.58**	.35*	—.50**

* Significant at the .05 level.
** Significant at the .01 level.

the model. "Trait" variance can be determined by examining the correlations between tests in different method blocks. Method variance is shown by the values within a particular block. The convergent validity of a test is found in its correlation with *different* methods for assessing self-acceptance. The relationships of each test with adjustment and dependency ratings are indications of construct validity. Finally, the correlations of the self-acceptance tests with social desirability are found in the SD rows of Tables 2 and 3. As shown in these tables, there appears to be a tendency for tests *within* a method to correlate higher than with tests representing a *different* method. Where method is identical, the average[1] correlations among the self-acceptance tests are .60 and .68 for males and females respectively. Where method is not identical, the mean intercorrelations are .50 and .45. Perhaps of greater importance than measurement model as a source of variance is within-test similarity. Thus, different scores calculated from the same test (IAV and ACL) correlate much higher than do scores derived from even very similar but separate instruments.

One evidence of validity lies in the convergence of the different methods of assessing self-acceptance. Although similar measurement models tend to produce more highly congruent scores than do tests following different measurement models, there are nevertheless substantial relationships among all of the self-acceptance tests. Overall, the mean intercorrelations of the self-acceptance tests are, for males and females, .53 and .52.

A second index of validity is shown by the correlations of the self-acceptance methods with ISB maladjustment and dependency ratings. The *r*'s shown in the adjustment and dependency rows are low to moderate. For males and females respectively, the mean correlation of the self-acceptance tests with ISB adjustment scores are .33 and .34. For the males, the mean *r* with ISB dependency ratings is .29. These relationships indicate that, as expected, low self-acceptance is associated with high maladjustment and dependency ratings. Considering the relationships with adjustment, the best tests seem to be the SA questionnaire, Gough SA, and the Buss scale. The SA questionnaire and the Gough SA, among the self-acceptance tests, relate most highly to dependency. In general, the two IAV measures are the least valid according to these indices.

From an inspection of the *SD* rows of Tables 2 and 3, it is apparent that these correlations are as high as (and in some cases higher than) the correlations between the self-acceptance methods. The generality of the self-acceptance tests in this study can be seen as extending in considerable degree to social desirability, as measured by the Edwards scale. The mean correlations with the *SD* factor are .48 and .52. Social desirability, in fact, correlates moderately with both ISB measures, although the value is higher for adjustment than for dependency. In these relationships, high self-acceptance is associated with the achievement of high *SD* scores, and also high *SD* scores are associated with low maladjustment and dependency ratings.

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[1] In the following analyses, correlations were converted to Fisher's z function for averaging.

C. STUDY II[2]

This phase of the research was concerned with the problem of the equivalence of four self-acceptance tests and with the utility of these instruments for predicting the dependent variable of adjustment as in Study I. A major purpose of Study II was to investigate these relationships in samples drawn from a population different than the college students employed in Study I.

1. *Method*

a. Tests. Four self-acceptance tests and an adjustment measure were used.

1. ACL. The measure used in this case was the SA score as described above in Study I.

2. Buss scale. An adaptation in scoring procedure was employed. *S* completed, as in Study I, the self-description but did not check adjectives descriptive of his ideal-concept. Instead, judges (12 graduate students in clinical psychology) checked the adjective in each group which they considered to be the most socially desirable self-description. Where judge agreement was not unanimous, the most frequently checked adjective was taken as the most socially desirable point on the continuum. The score derived from this procedure was the algebraic sum of differences in scale values between self-ratings and the maximally socially desirable adjectives. This afforded an opportunity to compare self-evaluations with a stereotype of an ideal-concept, as defined by the judges.

3. Semantic Differential technique (Osgood, Suci, and Tannenbaum, 1957).[3] *S* made successive self and ideal ratings on 19 pairs of adjectives (stable . . . changeable; cautious . . . rash), using seven-point scales. The sum of the absolute differences between ratings constituted the self-acceptance score.

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[2] This study is condensed from a master's thesis submitted to the Graduate School of Purdue University by the last-named author under the direction of the second-named author.

[3] The complete semantic differential technique is described in Kelly (1959).

4. SA questionnaire.

5. ISB. This test provided the adjustment measure as in Study I.

b. Subjects. This study employed 99 *S*s, including 78 male and female students in two Eastern high schools and 21 members of a social group composed of local female residents attending Purdue University.

c. Procedure. The high school *S*s were administered the various measures during regular class periods. *S*s in the social group were given an envelope containing the tests and asked to return the materials the following week. The semantic differential was not administered to these *S*s. In both groups *S*s who failed to properly complete one or more of the tests were discarded.

2. *Results*

The intercorrelations of the self-acceptance tests and the relationships of these measures to ISB adjustment scores are shown in Table 4.[4] For this analysis, the high school and social group *S*s were combined since correlations of approximately the same magnitude were found separately in each group.

TABLE 4
INTERCORRELATIONS OF SELF-ACCEPTANCE TEST AND ADJUSTMENT SCORES FOR THE COMBINED GROUP OF STUDY II[a]

	ACL	Buss	Sem. Diff.	SA
Buss	.59**			
Sem. Diff.	.53**	.35**		
SA	.57**	.37**	.58**	
Adjustment	.52**	.51**	.32*	.51**

[a] *N* varies between 58 and 96.
* Significant at the .05 level.
** Significant at the .01 level.

The most significant aspect of the results of Study II is seen in the striking tendency for the self-acceptance tests to correlate with one another and with the ISB in about the same magnitude as was found in Study I. This occurs in spite of differences in experimental procedure, tests and scoring, and subject population. Overall, Study II would appear to provide a clear replication of the results of the first investigation. Thus, as Table 4 shows, the intercorrelations of the self-acceptance tests range from .35 to .59 with a mean value of .51.

When the correlations with adjustment are added for consideration, the range of the correlation coefficients is from .32 to .59, with a mean of .47. Sheerly in terms of operational procedures, "adjustment" is as highly (or poorly, depending on one's perspective) related to measures of self-acceptance as the latter class of measures are interrelated.

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[4] In this table, correlations are all shown as positive. In no case were relationships contrary to expectation obtained.

D. Discussion

The correlational analyses in Study I and Study II of the convergent validity and equivalence of samples of current self-acceptance tests yield results which might appear promising or disappointing depending upon the standards chosen for convergence and operational equivalence. Concerning the question of convergent validity, it might be argued that there are hopeful indications of "trait" variance above and beyond method variance, in view of the fact that different methods for assessing the same variable are correlated. This trait variance, presumably, would represent the convergence of different test procedures on a somewhat generalized self-acceptance construct. But such an interpretation does not take account of the magnitude of the correlations between the self-acceptance tests and the SD factor. The mean value of these correlations is approximately the same as the average intercorrelation of the self-acceptance tests.

It currently remains true that the psychological meaning of high (or low, for that matter) social desirability scores on such measures as the Edwards SD scale is not clearly understood. At the same time, the nature of the items and the psychometric task required of *S* in completing the SD scale may clarify to an extent what is implied by high (or low) scores. The SD scale was constructed from MMPI items, drawn from the *F, L, K,* and Taylor Anxiety scales, on which there was unanimous judge agreement as to their social desirability or undesirability. Most of the items in the SD scale have, in addition to their scalability for social desirability, implications of pathology (Crowne and Marlowe, 1960). Thus, the scale can be interpreted as a measure of willingness to admit to symptoms that could be described as neurotic. The SD scale is thereby not dissimilar to other widely known tests of neurotic symptomatology or maladjustment.

With the correlations of the self-acceptance tests and the SD scale examined in this light, a plausible interpretation of the common variance is that *S*s tend consistently either to disavow or to acknowledge attributes and symptoms of a maladjustive and undesirable nature. The correlations of the SD scale with the ISB adjustment and dependency ratings similarly reflect this tendency and support the interpretation. Thus, there appears to be a trend for stereotyped responding to occur, in the sense that *S*s respond to even very dissimilar tests in a fashion that is remarkable for its consistency. Couch and Keniston (1960) have recently noted the consistent dispositions of *S*s to deny or acquiesce, and have shown that stereotyped responding can be accounted for in terms of personality variables.

The correspondence of three different methods for assessing self-acceptance is greater than has been found in the case of other personality variables such as *n* Achievement (Atkinson and Litwin, 1960; deCharms, Morrison, Reitman, and McClelland, 1955; Marlowe, 1959). However, the congruence of self-acceptance scores cannot, as the foregoing discussion shows, be simply interpreted in terms of the convergence of assessment methods on the construct. Self-evaluation, as measured by these tests, appears to be heavily influenced by stereotypes of what *S*s perceive as being good to acknowledge concerning oneself.

It is interesting to note that in the present study there were no exceptions in the relationships of self-acceptance measures to social desirability. In the Cowen and Tongas (1959) experiment, the IAV S-I discrepancy did not correlate ($r = —.05$) with social desirability ratings. Perhaps the discrepancy in the findings of their study and the present investigation is explicable on the ground that different social desirability measures were employed.

The construct validity aspects of this research fail to clarify the status of the self-acceptance tests. In the first place, the relationships between self-acceptance and other variables depend on the theory in which the constructs are embedded, and these relationships are often not made sufficiently explicit. Secondly, while the relationships obtained in the present investigation are at least in part consistent with theoretical formulation, they become of uncertain meaning when it is found that a test of adjustment is about as good a measure of self-acceptance as is a self-acceptance test itself, as evaluated by the criterion of agreement.

As the writers (Crowne and Stephens, in press) have elsewhere shown, research on self-acceptance is confronted by methodological problems which make the findings of studies on this variable difficult to interpret. If the present study further highlights certain of these problems and suggests that some of the research on self-acceptance may require reinterpretation, perhaps it may also be suggestive of the kinds of problems which demand attention. Certainly, more explicit links between self-acceptance constructs and their operational equivalents need to be provided, and theoretical differences should be more clearly specified. It would also appear to be fruitful to investigate the degree to which social stereotypes may be reflected in psychometric assessments of self-acceptance.

E. SUMMARY

This study was designed to provide an approximation to the convergent validation of a sample of current tests of self-acceptance and to assess their relationships with certain variables external to the concept. Tests representing different self-acceptance measurement models—self-ideal discrepancy, adjective check list, and self-rating scales—were intercorrelated, and their relationships were determined with social desirability, adjustment, and dependency. Further, these relationships were investigated in samples drawn from different populations.

It was found that the different methods of assessing self-acceptance were moderately correlated. Relationships with adjustment were similarly low to moderate, and low correlations were generally found with dependency. The most striking feature of the findings was the consistent correlation of the self-acceptance tests and other measures with social desirability, which appears to reflect the tendencies of *S*s to evaluate themselves consistently on a variety of tests.

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ATTITUDINAL OUTCOMES OF CHILD PSYCHOLOGY COURSES HAVING DIFFERENT ORIENTATIONS*

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A. INTRODUCTION

Previous investigations (1, 2) have shown that at the end of a one-semester course in child psychology, students' attitudes toward parent-child relationships were more permissive than at the beginning of the course. In teaching these classes the instructor had emphasized a clinical approach in examining family relationships. Is this type of orientation especially favorable for changing students' attitudes, or can other kinds of approaches be just as effective, or even more effective? The present report is a first step toward answering this question.

B. PROCEDURE

Two child psychology classes were studied, each being a different section of an undergraduate course at the University of Illinois. Class "C" was taught with a clinical orientation, the instructor placing a great deal of emphasis on case studies of parent-child relationships. Class "S" was taught by a different instructor, who also stressed parent-child relationships, but from a social and anthropological viewpoint, focusing on cross-cultural data. Both instructors had been teaching child psychology for several years. The difference in their approach to teaching this particular course was consistent with a difference in their areas of specialization, since the instructor of Class "C" was a clinical psychologist and the instructor of Class "S" a social psychologist.

Students in the two classes represented a variety of majors and colleges throughout the University, and were similar in these characteristics as well as in age and sex representation. None of the students had ever taken a college course in child psychology, child development, or family relations.

Formal classroom procedures and course organization were in most respects quite alike for the two classes, but there were marked differences in the

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[1] This article is based on a paper read September 8, 1959, at the convention of the American Psychological Association in Cincinnati, Ohio. John M. Kempton assisted in the statistical analysis of the data.

orientation of lectures, class discussions, and other aspects of course content and activities. For example, many of the films shown to Class "C" described the development and behavior of an individual child, and his relationship to his parents and other members of the family. Most of the films shown in Class "S" emphasized parent-child and other family relationships from a social or anthropological viewpoint, and were selected so as to facilitate generalizing about children on a cross-cultural basis. The term paper assignment for Class "C" asked the student to compare material he had read, or had encountered in class, with his own experiences as a child, or to relate this content to the behavior of a particular child or family which he had observed. The term paper assignment for Class "S" requested the student to examine child rearing attitudes and behavior in some non-American culture and analyze them in relationship to concepts and principles presented in class or in readings.

The test used to obtain the attitudes of the two classes was Schaefer and Bell's Parental Attitude Research Instrument (PARI) (3, 4, 5). This inventory measured five attitude factors: *suppression and interpersonal distance, rejection of the homemaking role, excessive demand for striving, over-possessiveness,* and *harsh punitive control.*[2]

At the beginning and end of the semester both classes responded to the PARI according to their own attitudes toward parent-child relationships. At the end of the semester each class was also asked to answer the PARI as it thought its instructor would. In addition, the two instructors used this same inventory to report their own attitudes.

An introductory psychology class, taught by the instructor of Class "C" was also given the PARI at the beginning and end of the semester in order to obtain its attitudes toward parent-child relationships.[3] None of the students had ever had a course in child psychology, child development, or family relations. This testing was carried out for two reasons: first, to see whether changes in attitudes toward parent-child relationships might occur simply as a result of students' general college experiences during a semester, independent of taking a course in child psychology; and second, to see if an instructor's "personality," as such, might possibly cause changes in attitudes toward parent-child relationships, regardless of whether or not the course he taught was child psychology. The introductory class was approximately the same as the two child psychology classes with respect to representation of majors and colleges within the University.

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[2] Since the analysis of the data for the present study were completed, other investigations (6) have shown that the PARI factors can be reduced to three: authoritarian-control, hostility-rejection, and democratic.

[3] Data obtained from this class were also reported in a previous study (2).

C. Results and Discussion

Table 1 shows the child psychology classes' mean scores for the attitude factors measured at the beginning and end of the course. According to tests of significance, which have not been indicated in the table, the two classes did not differ in how they perceived their own attitudes at the beginning of the course. At the end of the semester, however, Class "C" decreased its attitude intensity in three factors: *suppression and interpersonal distance, excessive demand for striving,* and *over-possessiveness.* Class "S" decreased its attitude intensity in one factor, *over-possessiveness.*

A comparison of the two classes' perceptions of their instructors' attitudes at the end of the course, also shown in Table 1, revealed that for one factor, *suppression and interpersonal distance,* the attitudes of Class "C" were significantly less intense than those of Class "S." For the remaining four factors, however, the two classes did not differ.

Table 2 shows the introductory psychology classes' mean scores for the five attitude factors measured at the beginning and end of the semester. None of the differences in means was significant. This finding seems to indicate, then, that the changes which occurred in the child psychology classes were outcomes of the courses they completed, rather than results of general college experiences, apart from such course work.

Was the greater change in the clinically oriented class a function of its instructor's "personality," as such, rather than a result of how he oriented the course? That is, was the instructor simply the kind of person who would be likely to induce changes in students' attitudes toward parent-child relationships, regardless of course content? On the basis of data obtained from the introductory class (Table 2), the answer seems to be "No," since this class was also taught by the instructor of Class "C," and still did not change its attitudes.

Did the greater change in Class "C" result primarily from a "copying" of what it thought its instructor's attitudes were rather than from the particular orientation of its course? Data in Table 1, under the heading "Self-attitudes *vs* perception of instructors' attitudes" show that the post-course self-attitudes of Class "C" were not significantly different from how this class perceived its instructor's attitudes at the end of the course. On the basis of this information alone, one might wish to conclude that Class

TABLE 1

CHILD PSYCHOLOGY STUDENTS' SELF-ATTITUDES, THEIR PERCEPTION OF INSTRUCTORS' ATTITUDES, AND INSTRUCTORS' SELF-ATTITUDES TOWARD PARENT-CHILD RELATIONSHIPS

N. of Class C ("Clinical") = 36 N. of Class S ("Social") = 39

	Attitude factor measured									
	Suppression and distance		Rejection of homemaking role		Excessive demand for striving		Over-possessiveness		Harsh punitive control	
	C	S	C	S	C	S	C	S	C	S
					Self-attitudes of students					
Precourse										
Mean	63.11	62.38	80.03	78.59	75.08	71.10	46.64	43.41	76.56	73.87
SD	8.62	8.54	9.02	9.35	13.43	10.08	10.10	8.03	11.73	9.45
Postcourse										
Mean	59.36	62.58	81.61	80.54	67.79	68.97	42.42	40.72	73.92	72.23
SD	6.95	7.95	10.62	10.66	10.82	10.75	7.46	7.62	11.25	9.74
r of scores	.46	.54	.63	.59	.73	.45	.67	.63	.69	.57
Diff. in mean	3.75[b]	.20	1.58	1.95	7.29[b]	2.13	4.22[b]	2.69[c]	2.64	1.64
t[a]	2.76	.16	1.11	1.23	3.97	1.89	3.35	2.49	1.75	1.16
					Students' perception of instructors' attitudes					
Postcourse										
Mean	59.44[d]	65.38[d]	80.94	82.05	66.67	68.82	43.17	44.69	71.58	73.69
SD	7.19	8.38	9.11	10.19	12.56	8.75	7.22	7.05	11.96	8.08
					Self-attitudes vs perception of instructors' attitudes					
r of postcourse scores	.72	.67	.78	.75	.57	.72	.76	.65	.65	.71
Diff. in postcourse means	.08	2.80[c]	.67	1.51	2.30	1.03	.75	3.97[b]	2.34	1.46
t[a]	.09	2.61	.60	1.28	1.26	.85	.88	4.01	1.44	1.30
					Instructors' self-attitudes					
Scores	72.0	53.0	67.0	90.0	59.0	60.0	42.0	34.0	64.0	66.0

Note. The higher the score, the more intense the attitude.

[a] Based on correlated means.

[b] $p < .01$.

[c] $p < .05$.

[d] The two means differ significantly ($t = 3.30$, $p < .01$).

"C" simply was imitating what it thought its instructor's attitudes were, rather than expressing changes in its own attitudes. Other findings, however, do not support this interpretation. As Table 1 indicates, Class "S" did not perceive its instructor's attitudes as significantly different from its own for three of the five factors measured at the end of the course. Yet, it expressed change in its own attitudes for only one factor, *over-possessiveness*. Furthermore, its postcourse self-attitudes for this factor were significantly less intense than its postcourse perception of its instructor's attitudes. It should also be noted that both classes revealed moderate correlations between their postcourse self-attitudes and their perceptions of instructors' attitudes. All in all, then, it seems unlikely that Class "C" changed its attitudes more than Class "S" simply because it was more successful in copying what it thought its instructor's attitudes were.

TABLE 2
ATTITUDES OF INTRODUCTORY PSYCHOLOGY STUDENTS TOWARD PARENT-CHILD RELATIONSHIPS
(N = 29)

	Attitude factor measured				
	Suppression and distance	Rejection of homemaking role	Excessive demand for striving	Over-possessiveness	Harsh punitive control
Precourse					
Mean	63.65	82.03	80.52	48.28	79.14
SD	6.51	11.46	14.47	10.13	15.01
Postcourse					
Mean	64.00	83.91	78.34	47.17	78.76
SD	6.91	10.39	13.68	11.00	13.73
r of scores	.66	.90	.87	.90	.87
Diff. in means	.35	1.90	2.17	1.10	.38
t[a]	.33	2.04	1.60	1.24	.27

Note. The higher the score, the more intense the attitude.
[a] Based on correlated means.

Did Class "C" change more than Class "S" because it was more "accurate" in perceiving its instructor's attitudes? The findings seem to warrant a negative answer. Examination of the data in Table 1 show no consistent correspondence between either class's perception of its instructor's attitudes and the instructor's own attitudes.

Did Class "C" change more than Class "S" because of differences in the two instructors' attitudes, even though neither class was highly accurate in appraising these attitudes? If so, the findings should have revealed some consistent relationships between changes in students' self-attitudes and their instructors' attitudes toward parent-child relationships. As Table 1 indicates, this did not occur. (Any comparison involving the two instructors' self-attitudes assumes, of course, that their PARI scores can be taken at face value; these scores are being interpreted "clinically" rather than "statistically.")

D. CONCLUSIONS

In light of the results discussed above, the investigator concludes that the greater changes in Class "C" occurred primarily because the clinical approach was used in teaching it. It may well be, therefore, that a clinical orientation in teaching child psychology is an especially favorable one for changing attitudes toward parent-child relationships, at least for those attitude factors measured by the PARI. Further studies need to be made which will supply more evidence on this score—studies in which larger numbers of students are used and other kinds of orientations compared. Such investigations might eventually reveal that instead of one particular orientation being the most effective for changing attitudes toward parent-child relationships, different approaches may each have unique advantages for such purposes, depending upon the kinds of changes in attitudes the instructor is trying to bring about, and the kinds of instruments used to measure the changes.

E. SUMMARY

Two child psychology classes were taught by different instructors, each with a contrasting orientation toward parent-child relationships: "clinical" (Class "C") and "social" (Class "S"). The PARI, which measures attitudes toward parent-child relationships, was used to obtain the students' own attitudes at the beginning and end of the course, their postcourse perceptions of their instructors' attitudes, and the two instructors' attitudes. The self-attitude of Class "C" decreased in intensity (became more permissive) for three factors, those of Class "S" for one factor. A control group of introductory psychology students, taught by the instructor of Class "C," showed no change in self-attitudes for any of the PARI factors. The greater changes in Class "C" seemed to be more related to the particular orientation of the course which it completed than to its perception of its instructor's attitudes, the accuracy of these perceptions, or the instructor's actual attitudes.

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CONTEXTUAL CONSTRAINT IN ENGLISH PROSE PARAGRAPHS*

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A. PROBLEM

Recent studies have found that constraints between letters in written English decrease rapidly with increasing distance between the letters, and that context beyond about 32 letters adds little to the certainty with which a missing letter can be restored (2, 13). By omitting single words from sentences of different lengths, Aborn, Rubenstein, and Sterling (1) found that, between words also, constraints are effective only over short distances. Their experiment was limited, however, to contexts of randomly-chosen, disconnected sentences. Their results raised the question of whether the constraints upon words in continuous discourse are cumulative over more extended lengths. In the present experiment, constraints within complete prose paragraphs were investigated by comparing restorations of omitted words when context at different distances from them was missing.[2] The results also relate to the effect of different omission patterns on the difficulty of restoring periodically omitted words ["cloze procedure" (14)].

B. METHOD

1. *Notation*

Words were omitted periodically throughout a paragraph, using several different patterns of omission. In some patterns, groups of adjacent words were omitted. The number of adjacent words omitted is symbolized by k, and the distance (in words) between omitted groups of words is symbolized by n, so that any periodic omission pattern may be designated by the symbol $k{:}n$. Thus, 1:2 indicates that every third word is omitted and 2:10 indicates

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[2] Nicol and Miller (11) recently reported a somewhat similar study, but their results for different lengths of context were inconsistent.

that pairs of omitted words are separated by 10 retained context words. In omitting words according to a simple periodic omission pattern, there are $k + n$ possible starting points. With a 1:2 pattern, for example, the 3rd, 6th, 9th, etc., words may be omitted, or the 2nd, 5th, 8th, etc., or the 1st, 4th, 7th, etc. Each distinct set of omission locations is referred to as an *omission set*. Omission sets are specified by following the pattern designation with parentheses enclosing numbers which show the location of the k words omitted in each cycle of $k + n$ words. For example, 4:20(21-24) means that the last four words in each cycle of 24 words are omitted.

A periodic *sub-set* of omissions, such as every fourth omitted word, is specified by regarding the words *omitted* by an omission set as a new sequence of words to which another omission set notation is applied. This second omission set notation is placed in brackets and follows the first. For example, every fourth word omitted by 1:2(3) is represented by 1:2(3)[1:3(4)].

2. *Omission Sets*

Fifteen different omission sets representing eight patterns were used with each of two prose passages. In order that comparisons between omission sets representing different omission patterns should reflect differences in the difficulty of the patterns, rather than in the difficulty of the specific words omitted, only those words omitted by all patterns in a given comparison were considered.

The 15 omission sets, arranged to illustrate some of the comparisons which they permit, are shown in Table 1.

The first group of four omission sets shown in Table 1, for example, provides for comparison of the difficulty of restoring every 24th word in a passage when every 3rd, every 6th, every 12th, or every 24th word is omitted. A similar comparison is provided by the second group of four omission sets. In this second comparison, an entirely different set of words is omitted. The next two groups of omission sets in Table 1 show comparisons for words omitted in pairs.

The comparisons discussed above concern the effect of changes in n when $k = 1$ or $k = 2$. The effect of changes in k when $n \cong 20$ can be estimated from a comparison of 4:20(21-24)[2:2(3-4)] vs. 2:22(23-24) vs. 1:23 (24) combined with 1:23(23). This comparison uses the two right-hand blanks in each group of four omitted words to represent the effect of $k = 4$, a procedure which is reasonable if the effect of position within each omitted word-group is symmetrical with respect to the center of the word-group. While it seems established at the level of letters that preceding and following context are about equally effective (10, 13), the results for words are not so clear (1, 8).

TABLE 1
THE OMISSION LOCATIONS ASSOCIATED WITH EACH OMISSION SET

	Words Omitted (–) and Retained (x)																							
Omission Set[a]	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4
1:2(3)	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–
1:5(6)	x	x	x	x	x	–	x	x	x	x	x	–	x	x	x	x	x	–	x	x	x	x	x	–
1:11(12)	x	x	x	x	x	x	x	x	x	x	x	–	x	x	x	x	x	x	x	x	x	x	x	–
1:23(24)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–
1:2(2)	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x	x	–	x
1:5(5)	x	x	x	x	–	x	x	x	x	x	–	x	x	x	x	x	–	x	x	x	x	x	–	x
1:11(11)	x	x	x	x	x	x	x	x	x	x	–	x	x	x	x	x	x	x	x	x	x	x	–	x
1:23(23)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–	x
2:4(5-6)	x	x	x	x	–	–	x	x	x	x	–	–	x	x	x	x	–	–	x	x	x	x	–	–
2:10(11-12)	x	x	x	x	x	x	x	x	x	x	–	–	x	x	x	x	x	x	x	x	x	x	–	–
2:22(23-24)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–	–
2:4(2-3)	x	–	–	x	x	x	x	–	–	x	x	x	x	–	–	x	x	x	x	–	–	x	x	x
2:10(8-9)	x	x	x	x	x	x	x	–	–	x	x	x	x	x	x	x	x	x	x	–	–	x	x	x
2:10(10-11)	x	x	x	x	x	x	x	x	x	–	–	x	x	x	x	x	x	x	x	x	x	–	–	x
4:20(21-24)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–	–	–	–

Note. The numbers at the top of the table represent the consecutively numbered words of a test passage. The rows in the table show the words omitted or retained in the omission set named at the left of the row. x signifies that the word is retained, – that the word is omitted. Only the first 24 words of the test passage are shown.

[a] The pattern $k{:}n$ indicates that, starting with the first $k+n$ words of a test passage, k words are replaced by blanks in each cycle of $k+n$ words. The numbers in parentheses show the locations of the k words replaced in each cycle according to their numerical position within the cycle.

In the present experiment, the relative constraint of the first and third upon the middle word in series of three was evaluated. Omission set 2:10 (10-11) omitted every 12th word (beginning with the 11th word) and the word preceding the 12th, while 2:10(11-12) omitted every 12th word and the word following the 12th. Thus, a comparison of 2:10(10-11) [1:1(2)] with 2:10(11-12)[1:1(1)] contrasts the effect, on restorations of the same words, of omitting the immediately preceding or the immediately following context words.

3. *Passages*

Two prose passages were used which differed considerably in content, style, and difficulty. The passages were both descriptive narratives of 144 words and contained no dialogue, numbers, proper names, or contractions. Passage *A* was adapted from a very simply written fairy story and had a

Lorge Readability Index (9) of 4.9. Passage *B*, adapted from a short story by Poe, had a Lorge Readability Index of 7.0.

4. *Materials*

Each *S* received a four-page "booklet." The first page was a 30-item vocabulary test consisting of the first 10 items of Form 1 of the Vocabulary Test—GT (7) and the last 10 items of both Form 1 and Form 2. The second page was a set of instructions, and the third was a mutilated test passage. The test passages were typed with triple spacing, and each omitted word was replaced by a one-inch underlined blank. With respect to punctuation and spacing, each underlined blank was treated exactly as if it had been a word. The fourth page of the booklet was a mutilated passage from a philosophical essay, added to keep all *S*s occupied throughout the testing period.

5. *Subjects*

*S*s were 600 college students. Twenty *S*s were assigned randomly to each omission set of each passage. Each *S* did just one omission set of one test passage. *S*s were tested in their regular classes. Twenty-four classes were sections in educational psychology, the remaining two were other education classes. Approximately 90 per cent of the *S*s were female, and 80 per cent were juniors. Their scores on the 20 words of Form 1 of the Vocabulary Test—GT indicated that the *S*s were an able group. Their mean score of 14.4 was roughly that of entering college freshmen at the upper quartile on the American Council Psychological Examination (15).

6. *Testing*

E conducted all testing. *S*s were allowed eight minutes for the vocabulary test, and were then asked to read the instructions, which showed two mutilated sentences with illustrations of how the blanks could be restored to complete the sense. The instructions emphasized that only one word was to be written in each blank, and that all blanks in the first passage were to be filled before beginning the last page. The instructions stressed that each restoration should be an attempt to duplicate the word the *author* would have used. A pilot study had shown that this wording made for more uniform understanding of the task. *S*s then worked the remainder of the class period (from 32 to 36 minutes) on the mutilated passages. No *S* failed to finish the test passage. Only 60 *S*s left any unfilled blanks.

C. RESULTS

The score for each *S* was the number of restored words in the omission set or sub-set which exactly matched the originals. The 20 scores for any one omission set or sub-set were compared with the scores for other omission sets or sub-sets. Variances for all comparisons were acceptably homogeneous as tested by the Hartley F_{max} test (5). For all comparisons of restoration scores, the .01 level of significance was used. The means of the vocabulary scores for the groups of 20 subjects restoring different omission sets did not differ significantly at the .05 level.

1. *Effect of Changes in n*

Two series of omission sets permitted comparison of the difficulty of restoring the same words in each of the four omission patterns for which $k = 1$ and n varied from 2 to 23.[3] Since it was assumed that the likelihood of a correct restoration is a negatively accelerated, increasing function of n, and that the slope of the function is near zero for large n, the omission sub-sets within each comparison series were treated as follows: If the hypothesis of equal means was rejected by a one-way analysis of variance, the between-groups sum of squares was partitioned to compare (*a*) the 1:2 pattern with the mean of the other three patterns and (*b*) the other three patterns. Since the differences among the means of the other three patterns were never significant, no further partition was made.

The comparisons are reported in Table 2. The hypothesis that the four means were equal was rejected for the words in 1:23(24) of Passage *A* and for the words in 1:23(23) of Passage *B*, and the subsequent partitioning showed, in both cases, a significant difference between the 1:2 pattern and the other three. Thus, no statistically significant difference was found in the difficulty of restoring omitted words when every 24th, 12th, or 6th word was omitted, but omitting every 3rd word made restoration more difficult.

The omission sets with $k = 2$ were compared in a similar way. For each passage, two independent comparisons were possible—one with three values of n, the other with two. No significant difference was found in the difficulty of 2:4, 2:10, and 2:22 omission patterns for either passage (Table 2).

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[3] For any of the comparison series involving three or more values of n, an additional comparison can be made involving different words and one less value of n (See Table 1). Such secondary comparisons are not independent of the first, however, and are not reported here. These secondary comparisons gave results like those for the primary comparisons reported.

TABLE 2
COMPARISONS OF RESTORATION SCORES

Omission Set or Sub-set	Passage *A*		Passage *B*		Maximum Possible Score
	Mean	SD	Mean	SD	
			For k = 1		
Words in 1:23(24)					
1:2(3)[1:7(8)]	2.95	1.10	2.30	.57	6
1:5(6)[1:3(4)]	4.25	1.07	2.70	.73	6
1:11(12)[1:1(2)]	4.10	.85	2.85	.74	6
1:23(24)	3.75	1.12	3.05	.89	6
Words in 1:23(23)					
1:2(2)[1:7(8)]	3.50	1.10	1.70	.80	6
1:5(5)[1:3(4)]	3.60	.75	2.05	1.10	6
1:11(11)[1:1(2)]	4.25	.97	2.60	.60	6
1:23(23)	3.80	.83	2.85	.93	6
			For k = 2		
2:4(5–6)[2:6(7–8)]	6.40	1.39	4.00	.92	12
2:10(11–12)[2:2(3–4)]	6.10	1.62	3.70	1.26	12
2:22(23–24)	5.65	1.81	3.50	1.32	12
2:4(2–3)[2:2(3–4)]	12.50	1.88	7.90	2.00	24
2:10(8–9)	14.05	2.14	7.45	1.93	24
	When an Adjacent Context Word is Omitted				
1:11(11)	10.05	1.28	4.65	1.18	12
2:10(10–11)[1:1(2)]	8.10	1.12	2.75	1.07	12
2:10(11–12)[1:1(1)]	8.20	1.70	2.55	1.32	12
	For 1–, 2–, and 4–Word Word Groups				
1:23(24) & 1:23(23)[a]	7.55	1.39	5.90	1.29	12
2:22(23–24)	5.65	1.81	3.50	1.32	12
4:20(21–24)[2:2(3–4)]	3.45	1.64	2.30	1.13	12

[a] The mean and standard deviation for this combined group were taken as the sum of the means, and as the square root of the sum of the variances, respectively, for the two omission sets.

2. *Relative Effectiveness of Preceding and Following Context*

Comparisons among omission set 1:11(11) and sub-sets 2:10(10-11) [1:1(2)] and 2:10(11-12)[1:1(1)] indicated that omitting an adjacent word made restoration of every 12th word significantly more difficult, but it made no difference whether the adjacent word preceded or followed the scored word (Table 2). For a distance of one word, at least, preceding and following context were equally effective.

3. *Effect of Changes in k*

Since the results reported above suggest that the difference between 20 and 23 context words is negligible and that positional effect within the word-groups is probably symmetrical, it appeared reasonable to compare the effects of $k = 1$, $k = 2$, and $k = 4$ through scores from 1:23(24) and 1:23(23), combined, 2:22(23-24), and 4:20(21-24) [2:2(3-4)], respectively.

The analysis was similar to the test for changes in n. Thus, if the hypothesis of equal means was rejected, the between-groups sum of squares was partitioned to provide a comparison (*a*) between the 1:23 patterns and the mean of the other two patterns and (*b*) a comparison between the 2:22 and the 4:20 patterns. Since both comparisons were significant for both passages, the difference between the 1:23 and the 2:22 patterns was tested by Scheffé's method (12). This difference was also significant for both passages. Thus, word restoration was more difficult when words were omitted in pairs than when omitted singly and more difficult when omitted in groups of four than when omitted in pairs (Table 2).

D. Discussion

The basic reason for using a paragraph for the study of context in preference to the design requiring the "next" word after giving a context of specified length, was that restoration of blanks and confusions in a continuous message is the usual use of context. The results show that additional uninterrupted context beyond five words did not help in the restoration of the missing words.

Since the data are based on different periodic omission patterns, they reflect differences both in total available context and in length of uninterrupted context. This fact leaves unresolved the question as to what extent the greater difficulty of restoration in the 1:2 pattern results from the *proximity* of missing context and to what extent from the *amount* of missing context. The comparisons with the $k = 2$ omission patterns, however, suggest that the greater influence is the proximity of the omitted context. The 2:4 pattern was not more difficult to restore than the other $k = 2$ patterns, in spite of the fact that the 2:4 pattern omits one-third of all the words in the passage. With the 2:4 pattern, the first omitted context word is still the fifth word distant from the pair to be restored.

The differences resulting from changes in k, when compared to those resulting from changes in n, also point to the importance of the proximity of omitted context. Starting with every 24th word, or 4 per cent of a passage omitted, another 4 per cent or even 13 per cent of the passage was omitted without making restoration more difficult as long as the omitted words were well spaced. But decreasing the context by 4 per cent and 13 per cent through successive doubling of k, decreased restoration scores at each step by about one-third.

Although it seems that constraints between words generally decrease very rapidly with distance, this does not mean that constraints never operate over distances of more than four or five words. Also, some constraints, such as knowing the topic of the paragraph, may have a more generalized influence that does not decline with decreasing length of context in an easily specifiable way. Carroll, Carton, and Wilds (3) report that when a paragraph is broken into 10-word segments with the 5th word in each segment omitted, restoration is much less accurate when the segments are presented in random order rather than in their original order.[4]

At a very remote level, a general form of constraint may be merely the knowledge that what is read or heard is rational discourse—that language rules will be observed and that the communication will make sense. Huey commented that, in a free association setting, "the mere statement that the word to be exposed is part of a reading passage limits the trend of association when no [other] context has been given" (6, p. 304).

Although various sources of constraint (e.g., topic, syntax, semantic reasonableness) can be distinguished conceptually, it has long been recognized that it is difficult in completion experiments to separate their effects (e.g., 4; 17, p. 650).

The results of this study demonstrate a basic limitation in the length of units which can be restored from context. In reading, for example, although understanding may often be gained without seeing every word clearly, if a *group* of words is missed, the loss generally is irretrievable from context, even though such lost groups may be both few and widely separated. Thus the redundancy of English acts for restorative purposes primarily with rather small segments of a message. If the omitted segments are small enough, they may be restored with great accuracy, even though they occur very frequently (10).

E. SUMMARY

Contextual constraint was studied through restorations of words omitted periodically from two English prose paragraphs. Restorations were made by college students and only exact duplicates of the original words were scored correct.

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[4] Scrambling the order of the segments probably not only obscures the paragraph topic, however, but also reduces restoration scores through misdirection and confusion. Miller and Friedman (10) found that substituted letters, even when marked as wrong, reduced letter restoration scores. Trabue, after extensive standardization of test sentences requiring restoration of omitted words, reported "that the difficulty of a test sentence is influenced rather markedly by the number and character of the sentences near it." (16, p. 22).

Comparison of restorations for different omission patterns showed that: (*a*) Words were equally restorable when every 24th, 12th, or 6th word was omitted, but omitting every 3rd word made restoration more difficult. (*b*) Words omitted in pairs were equally restorable regardless of whether 22, 10, or only 4 words of context were left between each omitted pair. (*c*) Words omitted in groups of four were more difficult to restore than words omitted in pairs, and pairs were more difficult to restore than single words. (*d*) Omitting an adjacent word made restoration more difficult, but restoration was equally difficult whether the additional omitted word preceded or followed the word to be restored.

The influence of context upon word choice in English prose seems to decrease rapidly with the distance of the context, and context more than about five words distant has relatively little effect.

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TACTUAL FORM DISCRIMINATION: DEVELOPMENTAL DIFFERENCES IN THE EFFECTS OF TRAINING UNDER CONDITIONS OF SPATIAL INTERFERENCE*

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A. PROBLEMS

A number of investigations have indicated that young normal children have great difficulty in localizing cutaneous tactile stimuli, particularly when two stimuli are administered simultaneously (Cohn, 1951; Fink and Bender, 1953).

In a developmental study comparing college students with 7-8 yr. old children on forms made of raised tacks the college students were superior to the children in judging whether members of pairs of such forms were the same or different, by a method of active manual exploration. However, the distance between discrimination score means for the two groups was significantly greater when judgments were obtained under conditions involving the presence of interferent tacks which were discriminably larger than the tacks used in constructing the forms to the discriminated. Adults obtained approximately the same discrimination scores when the interferent tacks were present and when they were absent. The children's discrimination score on the interferent task was significantly lower than on the non-interferent task. Furthermore, when groups were given the interferent task after they had been run on the non-interferent task an adult group achieved significantly higher performance scores on the interferent task than an adult group that was run only on the interferent task. Prior experience with the non-interferent task, on the other hand, did not facilitate the performance of children—there was a significant difference between a group run only on the interferent task and a group that was run on this task after it had been through the non-interferent task (Gollin, 1960).

The simultaneous two-point tactile stimulation and the active manual exploration techniques both reveal developmental disparities. In the former instance young normal children apparently have great difficulty in the

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"passive" apprehension and localization of two-point stimulation, and after many trials there is no improvement in performance. In the latter task a somewhat older group of children has great difficulty in disregarding the "noise" introduced by the interferent tacks under conditions of active manual contact.

B. EXPERIMENT I

Experiment I was designed to investigate the effect of systematic training in tactual form discrimination under conditions of non-interference upon tactual discrimination of the same forms with interferents added. The effect of a fixed number of training trials at three developmental periods was determined.

1. *Method*

a. Subjects. Summary descriptive data and assignment to experimental and control groups of the 50 children who served as *S*s is contained in Table 1. The children who were pupils in a public elementary school.[2] The 30 adult *S*s were volunteers from psychology classes at Queens College. Each experimental group contained an approximately equal number of males and females.

b. Materials and Procedure. Task *A* consisted of 20 standard forms and 20 comparison forms constructed of raised metal tacks hammered onto 10 × 10-in. shellacked plywood boards. Task *B* consisted of the same standard and comparison forms, but in Task *B* larger interferent tacks were scattered about the comparison forms (see Figure 1). In both tasks the standard was identical with the comparison form in 10 instances and different from the comparison form in the other 10 instances. The respective dimensions of the tacks were as follows: small ("form" tacks), diameter 1.52 cm., height .42 cm.; large ("interferent" tacks), diameter 1.82 cm., height .45 cm.[3]

In both tasks the standard and comparison forms were presented in a curtained box. The *S* never saw the tactual forms. The *S* was required to explore the standard form for 15 sec. with his preferred hand, hand flat with fingers together, and was then given up to 15 sec. on the comparison form with the same hand. He was told that the "bumps" on each board made a form or shape, and that for each pair of boards he must decide whether the successively explored forms were just the same or different. Before *S*

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[2] The writer wishes to express appreciation to Dr. Edward Moses, Principal of Public School 201, Flushing, New York, and to his staff for their cooperation in providing subjects and working facilities.

[3] An appendix containing detailed instructions, pictures of the apparatus, and of the forms has been deposited with the ADI and is referred to elsewhere (Gollin, 1960).

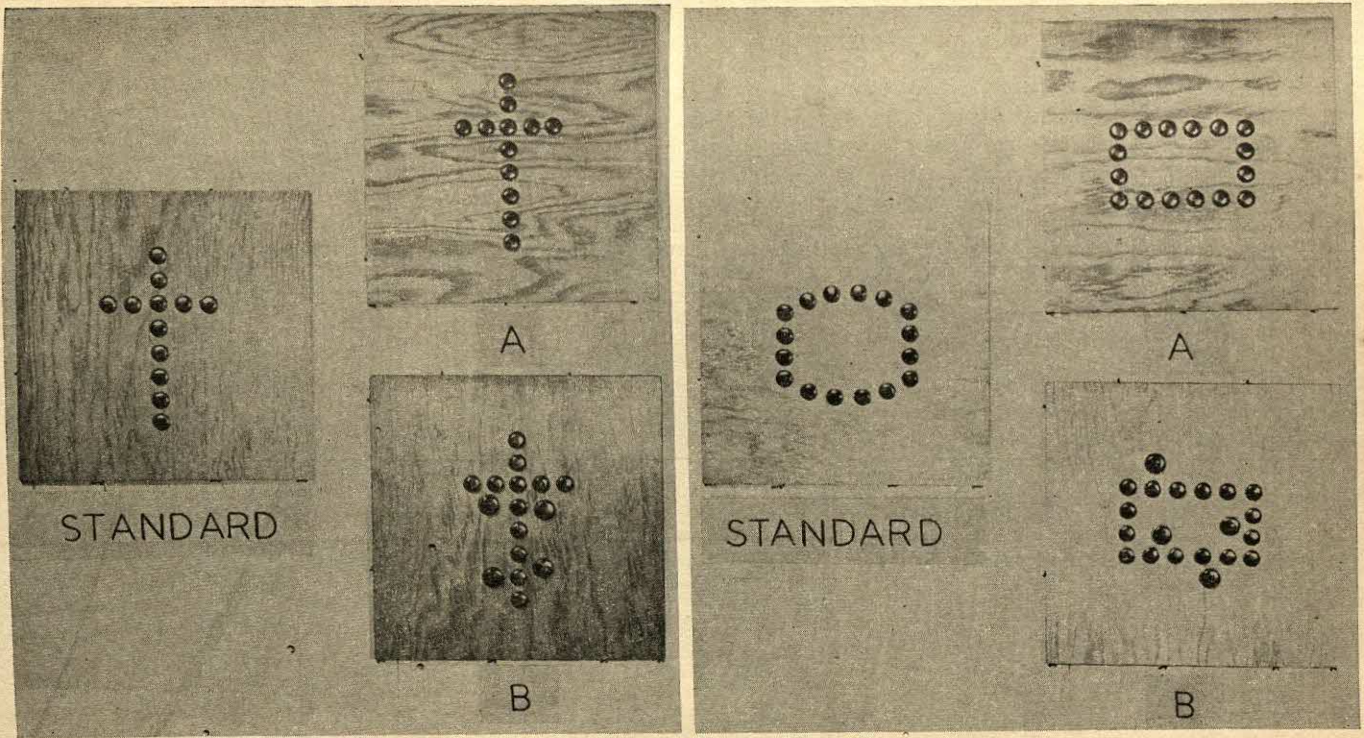

FIGURE 1
Examples of the materials used. In Task *A* the standards are compared with the *A* forms. In Task *B* the standards are compared with the *B* forms. The forms to the left are examples of those used in "same" trials, and the forms to the right are examples of those used in "different" trials.

TABLE 1

DESCRIPTIVE DATA AND DISCRIMINATION SCORE MEAN AND SDs

		IQ Scores[a]		CA (mo.)		Task *A*				Task *B*	
						Block I		Block II			
Group	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
7 yr. *A-B*	15	118	8.1	87	1.1	11.37	1.56	12.00	2.21	9.93	2.02
7 yr. *B* only	10	119	3.3	91	3.2	—	—	—	—	10.80	1.89
10 yr. *A-B*	15	118	8.5	122	2.7	13.60	1.61	14.67	2.29	13.53	1.71
10 yr. *B* only	10	119	4.3	124	4.0	—	—	—	—	10.90	2.12
Adult *A-B*	15	—	—	—	—	15.20	2.02	16.40	1.51	15.47	1.55
Adult *B* only	15	—	—	—	—	—	—	—	—	12.53	2.09

[a] The IQ scores were obtained from school records and are based on the Pintner-Cunningham Primary Test: Form *A* for the 7 yr. olds and on the Otis Quick-Scoring Mental Ability Test: Form Alpha for the 10 yr. olds.

was given Task *B* he was required to demonstrate that he could distinguish between a small and a large tack. All *S*s who were tested were able to make this discrimination. Prior to Task *B*, *S*s were told to disregard the larger "bumps" in making their judgments. In all Task *A* trials correct judgments were rewarded by the presentation of a postcard size picture of a baseball player for boys and a movie star for girls; *E* also said, "That's right." If *S*'s judgment was incorrect *E* said, "That's wrong." Adult *S*s received no reward other than the information as to whether they were right or wrong.

The training procedure on Task *A* was as follows: a block of two trials was administered on each of two successive days making two blocks or four training trials altogether. *S*s trained on Task *A* were tested on Task *B* approximately seven days after the completion of training. Control groups were tested on Task *B* only.

2. *Results*

Table 1 contains the discrimination score means and SDs of all groups. Experimental groups (Task *A*-Task *B*) were compared with control groups (Task *B* only) on Task *B* performance. Table 2 shows the results of an analysis of variance of discrimination scores on Task *B* for the three age groups and the two test conditions. *Age groups, conditions,* and *age* × *conditions* interaction produced statistically significant *F* values. Similar analyses for the 7 yr.-10 yr. age groups and the 10 yr.-adult age groups indicated the following: for the 7yr.-10 yr. comparison, *age groups* and *age* × *conditions* interaction were statistically significant while *conditions* was not significant ($F = 15.01$, $P < .001$—$F = 9.12$, $P < .005$—$F = 2.32$, $P > .10$); for the 10 yr.- adult comparison, *age groups* and *conditions* were statistically significant while *age* × *conditions* interaction was not significant ($F = 8.45$, $P < .001$—$F = 25.10$, $P < .01$—$F = 3.36$, $P > .05$). The significant interaction effects overall, and between the 7 yr.-10 yr. groups, together with the absence of a significant interaction effect in the 10 yr.-

TABLE 2
ANALYSIS OF VARIANCE OF DISCRIMINATION SCORES

Source	df	MS	F
Age groups	2	94.60	24.44*
Conditions	1	38.93	10.06**
Age × conditions	2	35.86	9.27*
Within	74	3.87	
Total	79		

* $p < .001$.
** $p < .005$.

adult analysis shows that the youngest group's (7 yr. olds) performance on Task *B* is not facilitated by training on Task *A* (between experimental and control groups there is no significant difference)—in fact the control *S*s (Task *B* only) achieved a higher mean score on Task *B* than did the experimental *S*s (Task *A*-*B*). Both the 10 yr. age group (between experimental and control *S*s on Task *B*, $t = 3.28 — P < .01$) and the adult group (between experimental and control *S*s on Task *B*, $t = 4.22 — P < .01$) show statistically significant improvement in performance as a function on training on Task *A*.

The change in performance from Block I to Block II on Task *A* was checked by t-tests for matched groups: the results of these tests for the 7 yr., 10 yr. and adult groups respectively were $t = 1.13 — P < .50$, $t = 1.84 — P < .10$, $t = 3.53 — P < .01$. Although neither of the children's groups showed statistically significant improvement from Block I to Block II on Task *A* the 10 yr. olds do show an advantage on Task *B*. Adult performance, while higher on Task *A* blocks and on Task *B*, differs from 10 yr. old performance essentially in magnitude. Both adult and 10 yr. performance differ from 7 yr. performance not only in magnitude but also interactively across Task *A* blocks and across Task *B* conditions.

C. Experiment II

In the first experiment, the effects of training on Task *A* on the performance of Task *B* were ascertained for 7 yr. olds, 10 yr. olds and adults. It was found that the 10 yr. olds and adults benefited from the training experience while the 7 yr. olds did not. This disparity in the effects of training between the 7 yr. olds and 10 yr. olds suggested that if both these groups were given more training trials on either Task *A* or Task *B*, the discrimination performance of the older groups should show greater improvement with training than the performance of the younger groups.

1. *Method*

a. Subjects. Summary descriptive data and assignment to experimental groups of the 33 children who served as *S*s is contained in Table 3. The children were pupils in the same school as the *S*s employed in Experiment I, except for three *S*s in each group who were in attendance at a summer day camp in Roslyn Heights, Long Island. All *S*s in this experiment were boys.

b. Materials and procedure. Materials were the same as used in Experiment I. Nine children in the 7-8 yr. age group and seven children in the 9-10 yr. age group were given six trials on Task *A*. Two trials were

TABLE 3

DESCRIPTIVE DATA AND DISCRIMINATION SCORE MEANS AND SDs

Group		N	IQ Scores[a] Mean	IQ Scores[a] SD	CA (mo.) Mean	CA (mo.) SD	Block I Mean	Block I SD	Block II Mean	Block II SD	Block III Mean	Block III SD
7-8 yr.	Task *A*	9	106	3.3	92	4.2	11.77	1.77	13.28	1.51	13.72	1.69
	Task *B*	9	109	4.8	93	4.9	10.50	1.31	10.22	.97	10.28	2.11
9-10 yr.	Task *A*	7	109	4.0	115	5.4	11.71	1.36	13.64	2.07	14.85	1.69
	Task *B*	8	107	6.9	117	7.1	11.31	.82	11.69	1.35	12.93	2.00

[a] The IQ scores were obtained from school records and are based on the Pintner-Cunningham Primary Test: Form *A* for the 7-8 yr. olds and on the Otis Quick-Scoring Mental Ability Test: Form Alpha for the 9-10 yr. olds.

administered on each of three successive days constituting three blocks of two trials each. Correct judgments were rewarded with postcard size pictures of baseball players. The verbal statements by *E* were the same as in the previous experiment. The same procedure was repeated for Task *B* which was given to nine children in the 7-8 yr. age group and eight children in the 9-10 yr. age group.

2. *Results*

The discrimination score means and SDs of the two age groups in each of the three successive two-trial blocks on Task *A* and Task *B* are shown in Table 3.

Table 4 contains six variance analyses. The main analysis for the 7-8 yr. age group indicates that there is a significant difference in performance attributable to *tasks* and a significant *tasks* × *blocks* interaction. The performance difference as well as the significant interaction is due to the significant *blocks effect* (improvement with training) for Task *A* and the absence of any significant *blocks effect* for Task *B*. This is shown in the secondary analyses contained in Table 4. The 7-8 yr. group improved significantly through Blocks I-III on Task *A*. On Task *B* this group's discrimination score on Block III was actually lower than on Block I.

The performance scores of the 9-10 yr. age group present a very different picture from that of the younger group. The variance attributable to *tasks* does not reach a statistically significant level of confidence nor is there a significant *blocks* × *tasks* interaction. There is, however, a statistically significant *blocks effect*. The secondary analyses for the 9-10 yr. group show that there is a significant improvement in performance in both Task *A* and Task *B*. The absence of a significant Task *B blocks effect* in the 7-8 yr. group coupled with the presence of a significant Task *B blocks effect* in the 9-10 yr. group shows, within the limits of this experiment, a developmental difference in the effects of training upon tactual form discrimination under conditions of spatial interference.

D. DISCUSSION

The results suggest that the course of tactual form discrimination learning of the youngest *S*s under the conditions of this experiment was somewhat different from that of both the 10 yr. old children and the adults. The presence of spatially distributed interferent tacks disrupted 7 yr. old performance sufficiently so that there was no improvement in performance through the three Task *B* rewarded training blocks (six trials). The performance of the 7 yr. olds on Task *A* demonstrated that they

TABLE 4

Analysis of Variance of Discrimination Scores

Group	Source	df	MS	F	Task	Source	df	MS	F
						Subjects	8	5.66	3.51[a]
	Tasks	1	88.16	17.78[c]	*A*	Blocks	2	11.09	6.81[b]
	Ss in same group	16	4.96			Ss × Bl.	16	1.61	
7-8 yr.	Total between Ss	17				Total	26		
	Blocks	2	2.21	1.09		Subjects	8	4.26	1.77
	Bl. × Tasks	2	7.19	3.56[a]	*B*	Blocks	2	.26	.11
	Pooled Ss × Bl.	32	2.02			Ss × Bl.	16	2.41	
						Total	26		
						Subjects	6	6.66	3.38[a]
	Tasks	1	22.77	4.01	*A*	Blocks	2	17.59	8.92[b]
	Ss in same group	13	5.67			Ss × Bl.	12	1.97	
9-10 yr.	Total between Ss	14				Total	20		
	Blocks	2	20.44	12.94[c]		Subjects	7	4.82	3.65[a]
	Bl. × Tasks	2	2.92	1.85	*B*	Blocks	2	5.79	4.39[a]
	Pooled Ss × Bl.	26	1.58			Ss × Bl.	14	1.32	
						Total	23		

[a] $P < .05$.
[b] $P < .01$.
[c] $P < .001$.

were able to apprehend the forms *per se* with sufficient skill to improve significantly their discrimination scores. The disruptive effects of the interferent tacks, while apparent in all groups, prevented any increase in discrimination facility only in the youngest group. Since this group as well as the older groups were able to discriminate a large ("interferent") tack from a small ("form") tack their failure to benefit from training does not appear to be attributable to deficiency in size discrimination ability but rather to inadequate perceptual definition of the forms in the presence of the interferents. They behaved as if they were unable to segregate and apprehend the forms in the presence of the larger "interferent" tacks.

E. SUMMARY

1. *Experiment I*

Seven yr. olds, 10 yr. olds and adults were trained on a tactual form discrimination task. The forms were constructed of raised tacks. One week later *S*s were tested on the same forms with discriminably larger "interferent" tacks scattered about the forms. The subjects were instructed to disregard the larger tacks. The two older groups achieved significantly higher discrimination scores on the interferent task than did their controls who had not received preliminary training. In contrast, the youngest group did *not* differ significantly from its control.

2. *Experiment II*

A group of 7-8 yr. old boys was given a series of training trials on the tactual form discrimination task without interferents and another group of the same age was given an equal number of training trials with the interferents present. The procedure was replicated with two groups of 9-10 yr. old boys. The older boys showed statistically significant increases in tactual form discrimination scores on both tasks. The younger boys improved significantly on the non-interferent task but showed no increase in discrimination score on the task containing the spatially distributed interferent tacks.

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THE TREATMENT OF A PSYCHOPATH WITH RATIONAL PSYCHOTHERAPY*

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Socalled psychopaths, or individuals suffering with a severe character disorder whose behavior is distinctly antisocial, are exceptionally difficult to treat with psychotherapy. They only rarely come for treatment on a voluntary basis; and when they are treated involuntarily, they tend to be resistant, surly, and in search of a "cure" that will involve no real effort on their part. Even when they come for private treatment, they are usually looking for magical, effortless "cures," and they tend to stay in treatment only for a short period of time and to make relatively little improvement.

Psychoanalytic techniques of approaching psychopaths are particularly ineffective for several reasons: These individuals are frequently non-introspective and non-verbal; they tend to be not overly-bright or well-educated; they are impatient of long-winded procedures; and they are highly sceptical or afraid of involved psychological analysis or interpretation. It is therefore only the exceptional psychopath who can be helped with analytic methods such as those employed by Lindner (1944) in his *Rebel Without a Cause.* Considerably modified techniques of interpretation, such as advocated by Cleckley (1950) and Schmideberg (1956) are often recommended instead.

Before attempting to treat any young delinquents or older criminals in my present private practice of psychotherapy, I had considerable experience in examining and treating them when I was Chief Psychologist at the New Jersey State Diagnostic Center and later Chief Psychologist of the New Jersey Department of Institutions and Agencies. At that time I became impressed with the fact that whether the offender was a thief, a sex deviate, a dope addict, or a murderer, about the very worst way to try to help him rehabilitate himself was to give him a moral lecture, appeal to his superego, or in any way blame him for his misdeeds. For I began to see at that time that, in their own peculiar ways, virtually all these offenders really were anxious and guilty underneath their façade of psychopathic bravado; and that, in fact, their criminal acts were frequently committed as a defensive

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attempt to protect them against their own feelings of low self-esteem. In other words, many of them were already being compulsively driven to psychopathic behavior by underlying guilt and anxiety; and to endeavor to make them more guilty and anxious, as is often at first attempted in psychoanalytic technique, would hardly help them lose their need for their compulsive defenses.

Instead, I found that if I temporarily showed the offender that I was *not* critical of his behavior, and if I at first allied myself with him (if necessary) against the authorities of the institution in which he was incarcerated (and whom he almost invariably saw as being persecutory), a notable degree of rapport could be established between us. Then, once the prisoner felt that I was really on his side, it was often possible to show him that his pattern of criminal behavior was not merely immoral and antisocial (which he of course knew without my telling him so) but that, more importantly, it was *self-defeating*. If I could convince him, which I often could, that however much society might be (from his standpoint, justifiably and revengefully) harmed by his crimes, he *himself* was invariably even more self-sabotaged by these acts and their usual consequences, then I had a fairly good chance of getting him to change his behavior in the future.

My many investigatory and therapeutic relationships with criminals taught me, then, that socalled hardened psychopaths, like other disturbed human beings, act in an irrational and self-defeating manner because they believe, quite falsely, that they are helping themselves thereby; and when they are calmly, unblamefully, and yet vigorously disabused of this belief, they are often capable of radically changing their philosophic orientation and their antisocial behavior which springs from that orientation. Because many or most of the classic psychopaths are, as Cleckley points out, basically psychotic, they are often most difficult to treat; and one must usually be contented with reasonably limited gains. Nonetheless, remarkable improvements in their general living patterns, and particularly in the reduction of their antisocial behavior, may result from proper treatment.

Partly as a result of my experience in treating youthful and older offenders, as well as considerable experience in working with run-of-the-mill neurotics and psychotics, I have in recent years developed a technique of psychotherapy, called rational therapy, which is particularly applicable to the treatment of severely neurotic and borderline psychotic individuals with whom psychoanalytic and other treatment methods have had poor success. Rational therapy, as I have explained in several previous publications (Ellis, 1957a, 1957b; 1958a, 1958b, 1958c), is based on the assumption that human beings normally become emotionally disturbed through acquiring irrational and illogical thoughts, philosophies, or attitudes. Emotion itself is conceived of as largely being a certain kind—a biased, prejudiced kind—of thought; and it is held that people can be taught to change their negative and disturbed feelings by changing the thoughts that invariably underlie these feelings.

The rational therapist believes, in other words, that patients (and other people) literally talk themselves into their neurotic or psychotic states by telling themselves illogical and irrational sentences, or ideas, which they have previously learned from their parents and their culture, and have internalized and keep ceaselessly—and senselessly—repeating. The main emphasis of the therapist who employs rational technique is on analyzing the patient's current problems—especially his feelings of anger, depression, anxiety, and guilt—and concretely showing him that these emotions arise not from past events or external situations but from his present irrational attitudes toward or illogical fears about these events and situations.

Thus, the patient is shown that he has one or more basic philosophic assumptions underlying his behavior and that if this behavior is self-defeating these assumptions must necessarily be ill-grounded. The main illogical assumptions which most patients have at the base of their disturbances include the following: (*a*) that it is a dire necessity for an adult human being to be approved or loved by almost everyone for almost everything he does; (*b*) that an individual should or must be perfectly competent, adequate, talented, and intelligent in all possible respects and is utterly worthless if he is incompetent in any way; (*c*) that one should severely blame oneself and others for mistakes and wrongdoings; (*d*) that it is terrible, horrible, and catastrophic when things are not the way one would like them to be; and (*e*) that most human unhappiness is externally caused or forced on one by outside people and events and that one has virtually no control over one's emotions and cannot help feeling badly on many occasions. These misleading assumptions are continually revealed and attacked by the rational therapist.

Where, in psychoanalytic techniques, considerable time is spent on showing the patient how he originally *became* disturbed, in rational analysis much more emphasis is placed on how he is *sustaining* his disturbance by *still* believing the nonsense, or illogical ideas, which first led him to feel and act in an aberrated fashion. Rational therapy differs from psychoanalytic procedures in that (*a*) not merely the facts and pschodynamics of the client's behavior are revealed but, more to the point, his underlying philosophies or ideas which lead to and flow from these historical facts; (*b*) a concerted *attack* is made on the irrational beliefs that are disclosed in the course of the therapeutic process; (*c*) emphasis is placed far less on the disclosure of the individual's unconscious drives or feelings than on revealing his unconscious and irrational *attitudes* which underlie these drives or feelings; (*d*) the therapist literally *teaches* the patient how to observe his (unconscious) illogical thinking and how, instead, to think straight; and (*e*) the patient is usually encouraged, urged, or commanded into emotionally reeducating *activity*.

A case involving the rational therapeutic treatment of a psychopath will now be described. The patient was a 25-year-old son of a well-to-do family and had been engaging in antisocial behavior, including lying, stealing, sexual irresponsibility, and physical assaults on others since the age of 14. He had been in trouble with the law on five different occasions, but had only been convicted once and spent one year in a reformatory. He displayed no guilt about his offenses and seemed not at all concerned about the fact that he had once helped cripple an old man whose candy store he and his youthful comrades had held up. He had had two illegitimate children by different girls, but made no effort to see them or contribute to their financial support. He came for psychotherapy only at the insistence of his lawyer, who told him that his one chance of being put on probation, instead of being sent to prison, for his latest offense (rifling several vending machines) was for him to plead emotional disturbance and convince the court that he was really trying to do something to help himself in regard to this disturbance.

For the first few sessions the patient was only moderately cooperative, kept postponing appointments without good cause, and came 10 or 15 minutes late to almost every interview. He would listen fairly attentively and take an active part in the sessions; but as soon as he left the therapist's office he would, in his own words, "forget almost everything we said," and come in for the next session without giving any thought to his problems or their possible alleviation. It was not that he resentfully was resisting therapy; but he quite frankly was doing little or nothing to "get with it."

During the first several sessions, little attempt was made by the therapist to get the full details of the patient's history. It was merely determined that he was the only son of a doting mother, who had always given him his way, and of a merchant father who had ostensibly been friendly and permissive, but who actually had held up to him almost impossibly high standards of achievement and who was severely disappointed whenever he fell below these standards. The patient—whom we shall call Jim—had been a spoiled brat with other children, over whom he was always trying to lord it; had never lived up to his potentialities in school; had started to gain attention from his peers and his teachers at an early age by nasty, show-off behavior; and had only been able to get along reasonably well with girls, one or more of whom he usually managed to have serve him while he sadistically exploited her masochistic tendencies.

Although the patient was quite intelligent, and could easily understand psychodynamic explanations of his behavior—such as the possible connection between his failing to satisfy his father's high standards of excellence and his trying to prove to others, by quite opposite antisocial actions, how "great" he was—no attempt to interpret or clarify such connections was made. For one thing, he stoutly opposed such "psychoanalytic crap" whenever the psychodynamics of his situation were even hinted at; for another thing, the rational therapist frequently makes relatively little use of this kind of historical clarification, since he deems it highly interesting but not necessarily conducive of basic personality change.

Instead, the patient's current circumstances were first focussed upon, and he was quickly and intensively shown that he kept defeating himself in the present—as well as in the past. Thus, he kept discussing with the therapist the possibility of his violating the terms of his bail and "skipping out of town." The therapist, without being in the least moralistic about this notion or taking any offence at the implied concept that therapy was not going to help the patient and that therefore he might as well go on living the kind of life he had always lived, calmly and ruthlessly showed Jim that (*a*) he had very little likelihood of being able to skip town without being caught in short order; (*b*) he would only lead a life of desperate evasion during the time he would remain free; and (*c*) he would most certainly know no mercy from the court if and when he was recaptured. Although, at first, the patient was most loathe to accept these grim facts, the therapist patiently persisted in forcing him to do so.

At the same time, the therapist kept showing Jim the silly and totally unrealistic philosophies behind his self-defeating notions of trying to skip bail. He was shown that he was grandiosely and idiotically telling himself that he *should* be able to do what he wanted just because he wanted to do so; that it was totally unfair and unethical for others, including the law, to stand in his way; and that it was utterly catastrophic when he was frustrated in his one-sided demands. And these assumptions, the therapist kept insisting, were thoroughly groundless and irrational.

"But why," asked Jim at one point in the fourth session, "shouldn't I want things to go my way? Why *shouldn't* I try to get what I want?"

Therapist: No reason at all. To want what you want when you want it is perfectly legitimate. But you, unfortunately, are doing one additional thing—and that's perfectly illegitimate.

Patient: What's that? what's the illegitimate thing?

Therapist: You're not only *wanting* what you want, but *demanding* it. You're taking a perfectly sane desire—to be able to avoid standing trial for your crimes, in this instance—and asininely turning it into an absolute *necessity*.

Patient: Why is that so crazy?

Therapist: For the simple reason that, first of all, *any* demand or necessity is crazy. Wanting a thing, wanting any damned thing you happen to crave, is fine—as long as you admit the possibility of your not being able to get it. But as soon as you demand something, turn it into a necessity, you simply won't be able to *stand* your not getting it. In that event, either you'll do something desperate to get it—as you usually have done in your long history of antisocial behavior—or else you'll keep making yourself angry, exceptionally frustrated, or anxious about not getting it. Either way, *you* lose.

Patient: But suppose I *can* get what I want?

Therapist: Fine—as long as you don't subsequently defeat your own ends by getting it. As in this case. Even assuming that you could skip bail successfully—which is very doubtful, except for a short while—would you *eventually* gain by having to live in terror of arrest for the remainder of your life or by having to give up everything and everyone you love here to run, let us say, to South America?

Patient: Perhaps not.

Therapist: Perhaps? Besides, let's assume, for a moment, that you really could get away with it—you really could skip bail and that you wouldn't get caught and wouldn't live in perpetual fear. Even then, would you be doing yourself such a great favor?

Patient: It seems to me I would! What more could I ask?

Therapist: A lot more. And it is just your *not* asking for a lot more that proves, to me at least, that you are a pretty sick guy.

Patient: In what way? What king of crap are you giving me? Bullshit!

Therapist: Well, I could get highly "ethical" and say that if you get away with things like that, with rifling vending machines, jumping bail, and such things, that you are then helping to create the kind of a world that you yourself would not want to live in, or certainly wouldn't want your friends or relatives to live in. For if you can get away with such acts, of course, others can too; and in such a pilfering, bail-jumping world, who would want to live?

Patient: But suppose I said that I didn't mind living in that kind of world—kind of liked it, in fact?

Therapist: Right. You might very well say that. And even mean it—though I wonder whether, if you really gave the matter careful thought, you would. But let us suppose you would. So I won't use that "ethical" argument with a presumably "unethical" and guiltless person like you. But there is still another, and better argument, and one that you and people like you, generally overlook.

Patient: And that is?

Therapist: That is—your own skin.

Patient: My own skin?

Therapist: Yes, your own thick and impenetrable skin. Your guiltless, ever so guiltless skin.

Patient: I don't get it. What the hell are you talking about?

Therapist: Simply this. Suppose, as we have been saying, you are truly guiltless. Suppose you, like Lucky Luciano and a few other guys who really seem to have got away scot-free with a life of crime, really do have a thick skin, and don't give a good goddam what happens to others who may suffer from your deeds, don't care what kind of a world you are helping to create. How, may I ask, can you—you personally, that is—manufacture and maintain that lovely, rugged, impenetrable skin?

Patient: What difference does it make how I got it, as long as it's there?

Therapist: Ah, but it does!—it does make a difference.

Patient: How the hell does it?

Therapist: Simply like this. The only practical way that you can get guiltless, can maintain an impenetrable skin under conditions such as we are describing, where you keep getting away with doing in others and reaping criminal rewards, is by hostility—by resenting, hating, loathing the world against which you are criminally behaving.

Patient: Can't I get away with these things without hating others? Why can't I?

Therapist: Not very likely. For why would a person do in others without hating them in some manner? And how could he not be at least *somewhat* concerned about the kind of dog-eat-dog social order he was creating unless he downed his potential concern with defensive resentment against others?

Patient: I don't know—. Why couldn't he?

Therapist: Have *you?*

Patient: Have I, you mean, managed not to—?

Therapist: Exactly! With your long history of lying to others. Leading them on to do all kinds of things they didn't want to do, really, by your misleading them as to your feelings for them. The girls you got pregnant and deserted, for instance. The partners in crime you double-crossed. The parents whose help you've always run back for after breaking promise after promise to them? Would you call that *love* you felt for these people? Affection? Kindliness?

Patient: Well—uh—no, not exactly.

Therapist: And the hostility, the resentment, the bitterness you felt for these people—and must keep perpetually feeling, mind you, as you keep "getting away" with crime after crime—did these emotions make you feel good, feel happy?

Patient: Well—at times, I must admit, they did.

Therapist: Yes, at times. But really, deep down, in your inmost heart, *does* it make you feel good, happy, buoyant, joyous to do people in, to hate them, to think that they are no damned good, to plot and scheme against them?

Patient: No, I guess not. Not always.

Therapist: Even most of the time?

Patient: No—uh—no. Very rarely, I must admit.

Therapist: Well, there's your answer.

Patient: You mean to the thick skin business? You mean that I thicken my skin by hating others—and only really hurt myself in the process.

Therapist: Isn't that the way it is? *really* is? Isn't your thick skin—like the lamps made of human skin by the Nazis, incidentally—built of, nourished on little but your own corrosive hatred for others? And doesn't that hatred mainly, in the long run, corrode you?

Patient: Hm. I—. You've given me something to think about there.

Therapist: By all means think about it. Give it some real, hard thought.

In a similar manner, the therapist, in session after session with this intelligent psychopath, kept directly bringing up, ruthlessly examining, and forthrightly attacking some of his basic philosophies of living, and showing him that these philosophies underlay his antisocial thoughts and behavior. No criticism of or attack on the patient *himself* was made; but merely on his ideas, his thoughts, his assumptions which (consciously and unconsciously) served as the foundation stones for his disordered feelings and actions.

After 22 sessions of this type of rational therapy, the patient finally was able to admit that for quite a long time he had vaguely sensed the self-defeatism and wrongness of his criminal behavior, but that he had been unable to make any concerted attack on it largely because he was afraid that he *couldn't* change it—that (*a*) he had no ability to control his antisocial tendencies; and (*b*) he felt that he would not be able to get along satisfactorily in life if he attempted to live more honestly. The therapist then started to make a frontal assault on the philosophies behind these defeatist feelings of the patient. He showed Jim that an individual's inability to control his behavior mainly stems from the *idea* that he cannot do so—that long-standing feelings are innate and unmanageable and that one simply *has* to be ruled by them. Instead, the therapist insisted, human feelings *are* invariably controllable—if one seeks out the self-propagandizing sentences (e.g., "I must do this," "I have no power to stop myself from doing this," etc.) which one unconsciously uses to create and maintain these "feelings."

Jim's severe feelings of inadequacy—his original feelings that he never could gain the attention of others unless he was a problem child and his later feelings that he could not compete in a civilized economy unless he resorted to lying or thieving behavior—were also traced to the self-propagated beliefs behind them (to the sentences, "I am utterly worthless unless I am always the center of attention, even though I gain this attention by unsocial behavior"; "If I competed with others in an honest manner, I would fall on my face, and that would be utterly disgraceful and unforgivable"; etc.). These self-sabotaging beliefs, and the internalized sentences continually maintaining them, were then not merely traced to their source (in Jim's early relations with his parents, teachers, and peers) but were logically analyzed, questioned, challenged, and counter-attacked by the therapist, until Jim learned to do a similar kind of self-analyzing, questioning, and challenging for himself.

After 31 sessions (mainly on a once-a-week basis) of this type of highly active rational psychotherapy, Jim (who by that time had been placed on probation) voluntarily gave up the fairly easy, well-paying, and unchallenging job which his family, because of their financial standing, had been able to secure for him, and decided to return to college to study to be an accountant. "All my life," he said during the closing session of therapy, "I have tried to avoid doing things the hard way—for fear, of course, of failing and thereby 'proving' to myself and others that I was no damned good. No more of that crap any more! I'm going to make a darned good try at the hard way, from now on; and if I fail, I fail. Better I fail that way than 'succeed' the stupid way I was 'succeeding' before. Not that I think I *will* fail now. But in case I do—so what?"

Jim is now (two years later) finishing up college and doing quite well at his school work. There is every reason to believe that he will continue to do so at his chosen field of endeavor. A self-defeating psychopath has finally turned into a forward-looking citizen. In this case, the patient's high intelligence and good family background unquestionably contributed to making him a more suitable prospect for psychotherapy than the average psychopath would usually be. The same technique of rational psychotherapy, however, has recently been used with several other individuals with severe character disorders and symptoms of acute antisocial behavior and it appears to work far better than the classical psychoanalytic and psychoanalytically oriented methods which I formerly employed with these same kind of patients. While rational therapy is no quick panacea for all human ills, it can be a remarkably effective technique when adequately and forcefully used with a wide variety of severely and moderately disturbed patients.

Summary. A summary is given of the main aspects of the technique of rational psychotherapy; and a case illustration is presented showing how this technique has been applied to a 25-year-old male with a long history of psychopathic behavior. It is held that individuals with severe character disorders, including symptoms of extreme antisocial behavior, can often be successfully treated if the therapist is not moralistic but he directly and actively institutes a rational-persuasive attack on the basic illogical beliefs and unrealistic ideologies which invariably underlie psychopathy.

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SOME CHARACTERISTICS OF ADULT DAYDREAMING*

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A. INTRODUCTION

The investigation to be reported here represents one phase of a program of research dealing with the functional role of daydreaming in the organization of personality. The daydream or conscious fantasy has long intrigued poets and writers, as well as psychologists and psychoanalysts. Despite a voluminous psychoanalytic literature based chiefly on personal introspection or the relatively limited samples available to clinicians, there is little systematic knowledge concerning the frequency, range, variation, and patterning of daydreaming behavior for normal adults or children. Most recent papers which touch on the structure or nature of daydreams still refer to Varendonck's (12) introspective accounts or to Freud's (1) brief paper on the poet as basic source material. Rapaport's (10) current effort at controlled introspection represents one of the few new attempts to provide systematic data on reverie. What theory we possess in this field stems chiefly from Freud's papers on thought and the psychology of the dream process, which are themselves speculative, albeit challenging (2, 3). In a sense the psychoanalytic theory of thought as elaborated by Rapaport has moved in the admirable direction of specificity to the point where testable deductions may become derivable. Yet much of this theoretical development has occurred on the basis of relatively little direct study of daydreaming in the general population. We still seem to be at a point in the field where our behavioral phenomena are not yet sufficiently discernible to provide a basis for integration of observable data into a more general theory which can then be tested by experiment.

The present investigation presents a preliminary survey of the reported

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daydream behavior of adults. No claim is made that the data here are representative of the general adult population. The intent for the present is to evaluate the usefulness of material obtained by large samplings of adults from various backgrounds at various ages. Some attempts have been made in the course of the survey to test theoretical notions concerning the origin or function of daydreaming, but the emphasis in this presentation is exploratory.

Approaching some operational formulation of a phenomenon as evanescent and subjective as the daydream has proven a difficult task indeed. Most writers in this area when discussing daydreams do not specify precisely whether they refer to memories, "castles in Spain," fantasies, problem-solving meditation, or aesthetic or poetic imaginings. Indeed the term itself has been assigned a somewhat negative character, at least in our society. Welsh (13), for example, in his MMPI analysis, includes the item, "I have a daydream life about which I do not tell other people," in a cluster he describes with the term "somewhat more malignant mentation." This categorization reflects an assumption concerning the pathological nature of a private daydream life which as yet has no empirical basis. The few early surveys of daydreaming in normal groups suggest that it is a widespread human activity (4).

Common usage of the term daydream is not too helpful in leading to an operational definition since it occasionally emphasizes wishful behavior, at other times curiosity about remote events or places, at other times creative activity. Popular emphases, while generally on the negative or pathological features of daydreaming, are not uniformly so, suggesting occasionally the positive role of the visionary or the progress obtained from imaginative projections of a better machine or way of life. In approaching some means of defining daydreaming in a manner that makes possible accumulation of communicable data on its range and behavioral significance, it has seemed best to avoid any implication of pathology and to focus on a facet of thinking sufficiently inclusive of the variety of phenomena termed daydreaming. A defining characteristic which seems most useful in delineating daydreaming from thought in general seems to be relevance to an ongoing task being performed by the individual. It appears most meaningful, if we are to employ a concept such as daydreaming, to take it in the usage that it is a relative diversion from some more concrete or ongoing organismic task. Thought that is directly geared towards the immediate task of the subject is excluded.

For example, a repairman inspecting an electrical circuit may concentrate his thoughts on comparable circuits or on recall of technical material which will help him determine what is wrong with the equipment. This is direct problem-solving thought and far removed from daydreaming. If, however, while working on the circuit he finds himself meditating on whether he will be able to collect the fee he charged for yesterday's job, he has drifted away from the immediate task into a daydream. The problem-solving aspect may still be present and he may actually figure out how to collect his money, but this is irrelevant to his immediate task which is trouble-shooting a specific circuit. He might also find himself thinking about life on a tropical isle, about his discord with his wife or various anxieties and self doubts; all these thoughts would have in common some degree of irrelevance to his ongoing task. If we seek to classify these daydreams along other dimensions within this daydream category, we might view some as relatively planful or realistic, others as wishful components. It remains an empirical question whether there are patterns of difference between individuals along these dimensions; whether some persons tend towards more "castles in Spain," wishful but impossible daydreams while others tend towards wholly realistic wishful or planful activity. A host of questions arise at once. What behavior personality characteristics vary concommitantly with these two general types of daydreams? Is one type of daydream far more adaptive than another from a mental health standpoint? Is sheer quantity of daydream activity a more crucial parameter than content or form of daydreams? These and many other questions immediately arise when we examine this area and call for some data to help in formulating hypotheses and theoretical connections.

A modest approach to these issues may be made by in effect asking a large number of adults from diverse backgrounds to describe the patterns and content of their daydreams and to give examples. This has been attempted in the present study by preparation of a simple questionnaire. The present report includes some of the data resulting from replies to the questionnaire and a statistical analysis of relationships between various background variables such as age, sex, education, rural-urban background, and sociocultural background, and self-reports of daydreaming frequency as well as with specific types of daydream content. Some additional material was included in the questionnaire in order to ascertain whether daydream frequency is related to identification with parental figures, with creativity of spontaneous fantasy and story-telling ability.

B. PROCEDURE

The Daydream Questionnaire was developed initially from a list of approximately 10 categories of daydreams based on available clinical literature. Only material on conscious fantasy was employed. Constructions based on psychoanalytic inferences drawn from dreams or symptomatic acts and presumably representing "unconscious fantasies" were not included for the present purposes. Drawing upon literature and clinical examples, a list of more than 100 fantasies was drawn up and administered to a group of 40 graduate students in education. Replies to this questionnaire were analyzed in terms of frequency and also for comments (requested of students in advance) concerning comprehension and meaningfulness of items. Items showing minimal variability were eliminated and the questionnaire was rewritten and supplemented by other procedures described below.

The Daydream Questionnaire and other procedures were then administered to 240 Summer Session students at Teachers College, Columbia University, City College of New York, and Hunter College.

The *S*s ranged in age from 19 through 50 and included both graduate and undergraduate students from extremely diverse backgrounds. The largest group of *S*s were from Teachers College, Columbia, and had come from various parts of the country for summer courses. While socioeconomic status showed minimal variability (most *S*s falling in categories from lower-middle to upper-middle class status) several distinct sociocultural groups were clearly identifiable, e.g., Negro, Jewish, and "Old Americans" of Anglo-Saxon background. Other smaller groups included German, Irish, Italian, and *S*s with mixed subcultural origins.

Two-thirds of the *S*s were women in this sample. Fifty-nine per cent of the sample fell in the age range from 18 to 29, 24 per cent were between 30 and 39, and 17 per cent between 40 and 49. Two-thirds of the group had completed college and the remainder were still undergraduates. Forty-three per cent of the *S*s were reared in large cities, 20 per cent in suburbs, 24 per cent in small cities or towns, and 13 per cent in rural areas.

1. *Description of the Daydream Questionnaire*

The Questionnaire consists in revised form, of a face sheet calling for data on age, marital status, education, parental information to be used in establishing socioeconomic origin, sociocultural background, number of siblings, etc. There follow 130 items to be answered in accordance with instructions which define daydreaming and which urge candor since replies are anonymous. The first 37 items consist of statements concerning general patterns of daydreaming, e.g., "I engage in some form of daydreaming every day;" "I enjoy daydreaming;" "I daydream after a failure experience or frustration." The remaining 93 items consist of specific daydreams. A total score based on the rating from 1-6 of the frequency of each daydream has been derived from the second section and is referred to as the Daydream Score. Examples of specific daydreams in this section include: "I plan how to increase my income in the next year;" "I have my own yacht and plan a cruise of the Eastern seaboard;" "As a child I imagined myself a great detective;" "I see myself in Heaven and see myself transformed;" "I see myself eating and drinking at a great banquet with unusual delicacies."

2. *Additional Procedures*

In addition to the Daydream items, *S*s were asked to write examples of actual daydreams and night dreams, and then to make up an original story. The actual daydream and spontaneous story were scored independently by three judges for creativity, defined as introduction of original material, characters other than *S*, flexibility in time and space, and vivid emotional expressiveness.

A final phase of this particular study included a Parental Identification technique based on a procedure employed in an earlier study by Dr. Marion Oliner (8). A series of 44 behavioral items (e.g., "reading love stories," "reading adventure stories," "cooking," "starting conversation with strangers," "swearing," etc.) were filled out by *S*s as they appeared satisfying to himself, his Mother, his Father, and his Ideal Self. The absolute differences between Self and answers for each of the three other categories were scored and mean scores for each *S* on Self minus Father, Self minus Mother, and Self minus Ideal, Father minus Mother, Mother minus Ideal, and Father minus Ideal were obtained. This final procedure was employed as one avenue for exploring a hypothesized relationship between relative identification with mother and tendency to resort to fantasy. To the extent that, in our society, the father stands for work and action while the mother stands for control of impulses and for acceptance of flights of fancy or spiritual values, *S*s closer to their mothers than their fathers would be expected to show greater daydream tendencies and creativity in their spontaneous story-telling material.

C. ANALYSIS OF THE QUESTIONNAIRE

1. *Scoring*

The items of the questionnaire on Fantasy were scored on a six-point scale. Means and medians for the total groups of *S*s on all the individual items and on the Daydream Score were obtained. Analyses by various subcategories, e.g., age, marital status, sociocultural background, etc., were also carried out. A trial scoring of the ratings on a 1 or 0 basis was also carried out but yielded consistently lower correlations with other variables than did the *S*s' self-weighted scoring of frequency of the specific daydreams.

2. *Internal Consistency*

The internal consistency of the items for both the general section and specific fantasy items was calculated by means of Cronbach's Alpha Coefficient. The first section of 37 items (General Daydreaming) yielded an Alpha of .90 while the Fantasy score (based on the second group of 93 items) yielded an Alpha of .96. An item analysis determined the relative contribution of each specific daydream example to the total score. The distribution of Daydream scores closely approximated normality for the total sample.

D. RESULTS

1. *General Characteristics of Daydreaming Behavior*

Analysis of the questionnaire responses in terms of median frequencies for the weighted items makes it possible to evaluate tentatively some general characteristics of daydreaming for this sample. For example, it is noteworthy that 96 per cent of *S*s report that they engage in some form of daydreaming daily. These daydreams take the form of fairly clear images of people, objects, or events. Visual imagery seems quite common for this sample. Daydreaming is reported to occur chiefly when one is alone. Items dealing with daydream planning for future actions and particularly interpersonal contacts are high in frequency. Most daydreaming is reported to occur shortly before sleep when the respondent is in bed. Most people reported that they enjoyed daydreaming and denied that it embarrassed them. Daydreaming was indicated to be least frequent upon awakening in the morning, during meals, and during sexual activity. Analysis of the first 37 items of the questionnaire yields the general conclusion that daydreaming is a remarkably widespread common occurrence when people are alone and in restful motor states. It is a human function that involves resort to visual imagery and is strongly oriented towards future interpersonal behavior.

We may next consider the specific daydreams which our sample reports as most frequent. It is clear that the daydreams ranked as 2 or higher in frequency by the largest percentage of *S*s seem to involve fairly practical immediate concerns of the persons who fall within the general scope of this sample. Items such as "I think about the specific steps to be taken in connection with my job during the next three or four weeks," "I think about the details of my next vacation," and "I plan how to increase my income in the next year" are reported as relatively frequent by more than 80 per cent of *S*s. Items that might be thought of as reflecting considerably greater *private* concern such as "I imagine myself clasped in the embrace of a warm loving person who will satisfy all my needs," "I picture myself as a very different and more effective person than I am," and "I am a person who deeply feels the suffering of others and strives to correct their lives" are also reported as quite frequent by more than 80 per cent of the respondents. Thus it appears that while the most frequent daydreams include matters of highly socially acceptable concern such as self-improvement, practical future planning, and attainment of financial security, a very high proportion of *S*s also indicate frequent daydreams dealing with sexual satisfaction, altruistic concern, and unusual good fortune. Items with high probability of occurrence in the future (e.g., "vacation plans") and items of a more speculative or wishful nature ("inherit a million dollars," or "I think of what Heaven . . . might be like") occur together in this list of high frequency of report. It seems clear from inspection of the range of items with high frequencies in the entire questionnaire that daydreaming cannot be equated with specifically wish-fulfilling ideation. It would appear more appropriate to look upon the content of daydreaming for this sample as reflecting attempts at exploring the future, as Freud suggested, through "trial actions" or through posing a variety of alternatives not specifically involving satisfactory outcomes. The predominant content of daydreams seems to reflect fairly practical concern with the *S*s' life situations, yet it is apparent that more speculative contents emerge. And it is of interest, incidentally, that daydreams of relatively unconventional concern such as Messianic fantasies, homosexual satisfaction, and family murder are reported by a few of our *S*s as having occurred with some frequency.

In an effort to evaluate the particular types of daydreams which might characterize *S*s who reported a high frequency of daydreaming, a Flanagan item analysis was carried out using the total Daydream Score. Product-moment correlation coefficients were computed for items rated as more frequent by the 27 per cent highest and 27 per cent lowest of the sample in Daydream Score. Examples of items with coefficients of .70 or greater and thus highly discriminating between High and Low Daydreamers include: "I picture myself committing a crime and escaping undetected;" "I win the Irish sweepstakes . . . ;" "I see myself as being seduced by an older person of great wealth and influence who can protect me or further my career;" "I picture what it would be like to inherit one million dollars . . . ;" "In the course of my reading I stumble on an idea which is completely new and publish it."

Evaluation of the overall character of the daydreams which differentiate between the extreme groups suggests that on the whole the High Frequency group subscribes to statements that are more fantastic or unlikely of occurrence with both wishful and, to a lesser extent, anxious content. Heroic achievement, Messianic identification, and sensual gratifications are all included. It seems clear that the High Daydreaming group has available a dimension of experience along which any number of possible human behaviors can be played out with relative impunity.

2. *Daydream Scores and Background Factors*

Employing the Daydream Score, derived by totalling the self-weighted frequencies for the 93 specific daydream items, we may next examine the relationship between this measure of daydreaming frequency and the background variables of the study. Separate breakdowns at the medians for High and Low Daydream Scores were obtained and Chi-squares were carried out with breakdowns of sex, age, educational level, rural-urban origin, number of siblings, and sociocultural background. There were no significant sex differences in daydreaming frequency for this sample, the males showing a tendency toward somewhat higher scores only for the middle range of the distribution. Some differences in the relationship between the Daydream Score and other variables as a function of sex do emerge and will be discussed separately.

a. Age. A significant decline in reported daydreaming frequency emerges with age for this sample ($\chi^2 = 7.03$, $P = .05$). The maximum daydreaming reported occurred in *S*s between 18 and 29 with decreasing frequency in the 30-39 group and lowest scores in *S*s aged 40 and 49. No really elderly persons were included, however, and it remains a possibility that with items geared more towards the *past* and reminiscence, the frequency of daydreaming among the very old might hold up well. The age result was more striking for women than for men, however.

Two possible explanations, not mutually exclusive, suggest themselves. One is that the increased responsibilities and family involvements of the older *S*s leave little time for solitude and the conditions necessary for daydreaming. The older *S*s are more directly involved with actions and interpersonal contacts in the age range for this sample. Marital status was not itself related to Daydream Score, however. The second possibility is that daydreaming is a function that involves even in its fantastic aspects some attitude towards the *probable*. Thus as the *S*s in this group have moved from the late teens and twenties full of plans and possibilities or training towards long-range goals into the crystallized roles and more limited scope of career and family possibilities of middle age, the distant future beckons less and concerns are narrowed to current and immediate future situations. Further study of this time-perspective facet of aging is obviously desirable to settle these points.

b. Education and socioeconomic status. Since this sample was relatively homogeneous in educational level no significant relationship between educational level and daydreaming emerged. It is possible that were non-college-trained *S*s available some findings would emerge, but these might well reflect socioeconomic background as well. Since our sample showed very little range and variability in socioeconomic class, no attempt was made to test this variable in relation to Daydreaming Score. Almost all *S*s fell clearly into lower-middle and middle-middle class groups providing insufficient bases for any further analysis.

c. Number of siblings. To the extent that daydreaming may arise as a function of both loneliness and closer contact or identification with parental figures (6) one might expect that *S*s who were only-children or from small families would show greater daydreaming tendencies. The data from the present study offer no support for this hypothesis since none of the various breakdowns of number of siblings deviate from chance expectancies.

d. Rural-urban background. When *S*s are broken down into groups based on being raised in large cities, small cities, suburbs, small towns, and rural areas, a χ^2 of 12.97, $P = .02$ emerges. The highest daydream frequency is reported by those *S*s raised in large cities, while *S*s raised in suburbs report lowest daydream tendencies. Actually, persons from either large cities or rural areas contrast sharply with *S*s from small towns or suburbs. While sociocultural groups may play some part here, no clear indication is available to explain this finding. One wonders, however, if city life and rural life do not provide in their own ways greater loneliness or periods of solitariness (whether wandering through the fields or sitting in the subway) than do the relatively greater organized activities of suburban life with its emphasis on "togetherness."

e. Sociocultural background. Perhaps the most striking result obtained in the analysis of questionnaire responses was the finding of large differences between *S*s from differing subcultural groups in daydreaming frequency and content. A more intensive analysis of these results with the addition of larger samples of other groups than were available here is now in preparation. In the present study when *S*s were categorized according to the following subcultural backgrounds (both parents): Negro, Jewish, Anglo-Saxon, Mixed

Parentage, and Other (small samples of German, Polish, etc.), significant association with Daydream Score emerges ($\chi^2 = 14.5$, $P = .01$). The Negro and Jewish *S*s show the highest daydream frequencies, the Anglo-Saxons the lowest. This was particularly true for female *S*s since the male *N* was too small in some cases but subsequent findings with added male respondents support the general result. It seems likely that a number of factors may be involved. These may include a particular family constellation conducive to daydreaming tendency as well as possibly both adult cultural values supportive or critical of such behavior. It may be speculated that an upwardly-mobile minority group (e.g., middle-class Jews and Negroes) may suffer greater insecurity or concern about the future than a relatively secure in-group (middle-class Anglo-Saxon), and this preoccupation could easily be reflected in an increased frequency of daydreaming.

3. *Daydreaming Frequency and Creativity of Spontaneous Material*

Every *S* had been required to write out one example of his own daydreams as well as to make up an original story. It had been hypothesized that frequency of daydreaming should bear at least some rough relationship to creativity in verbal expression of story or daydream material. Considering that *S*s filled out the questionnaire at their leisure one might expect considerable uncontrolled variability to enter into the production of story and spontaneous daydream material. Scoring of the results for Creativity proved fairly reliable with only 11 instances out of 240 in which a difference as large as two points on a five-point scale emerged between ratings.

For the present sample, Creativity showed no relationship to age, sex, number of siblings, or rural-urban background. There was a slight tendency for men to show higher scores than women.

The correlation between Daydream Score and Creativity was $+.21$, significant at $P < .01$. The results thus indicate a significant if small degree of association between the creativity and originality of spontaneous story and daydream content and the frequency of reported daydreaming behavior.

The finding of a positive association of daydream frequency and creativity in story-telling appears to contradict a previous report by Page (9) that daydreaming frequency correlated negatively with richness of TAT stories. Page interpreted his results as supporting a drive reduction theory of daydreaming since *S*s with high frequencies of conscious daydreaming felt little need to express these themes in TAT stories. The results of the present study and of a related paper (11) are not directly comparable with Page's work since actual TAT stimuli were not employed here. Still, the finding in both cases that richness of spontaneous story-telling and that of daydream content are positively associated argues against a simple "drive reduction" view. Research that is focused specifically on testing this issue is obviously called for to resolve the difference between the present report and the findings of Page.

4. *Daydreaming and Assumed Similarity to Parental Figures*

The rationale for inclusion of the measures of "identification" with parental figures grew out of concern with the role of the family constellation in shaping attitudes towards daydreaming. The variables in this portion of the study included Self minus Ideal, Self minus Mother, Self minus Father, Mother minus Ideal, Father minus Ideal, and Father minus Mother. In all cases absolute differences in responses to the behavioral sample questionnaires were employed. In general some degree of validity of these indices was suggested by the significant sex differences where expected, e.g., men showed greater discrepancies between Self and Mother than women, and women greater discrepancies between Self and Father than men.

To the extent that a closer relationship with the mother is theoretically related to development of daydreaming tendencies, specific patterns of positive or negative correlations could be expected for men and women separately. The results were more striking for the male *S*s than for the women in this sample. A correlation of —.19 emerged between Daydream frequency and Self-Mother discrepancy while the correlation between Self-Father discrepancy and Daydreaming was + .30. Thus, men who perceived themselves as relatively less different from their mothers and as relatively more different from their fathers showed a tendency toward higher daydreaming. For the women the only significant relationship to emerge was + .21 between the Father-Ideal Self discrepancy and Daydreaming Score, a result which tends towards supporting the hypothesis and also the positive results obtained in the previous study by Singer and Schonbar (11) with a smaller sample. The greater the discrepancy between Father and Ideal for these women, the greater their daydreaming tendency.

These results suggest that, in general, perceived similarity of self to the mother or difference from the father is associated—for men and (less definitely in this study) women—with reported frequency of resort to daydreaming. If we next examine these identification scores in comparison with the measures of Creativity of actual daydreams and stories, further support for this hypothesis emerges. For men, Creativity correlates + .25 with Self minus Father and —.30 with Self minus Mother as well as —.28 with

Mother minus Ideal Self. For the women Creativity correlated —.13 with the Self-Mother discrepancy as well as +.22 with Father-Ideal Self discrepancy. Thus, findings from both the Creativity and questionnaire measures lend support to the general hypothesis that for both men and women a relatively closer perceived similarity of behavior and attitude to the Mother figure is likely to be at least crudely associated with an inclination towards richness of inner living. A more detailed and inclusive study in this area is obviously called for, however, since the results in this study have generally involved low correlations.

E. Discussion

Recognizing the limited scope of this sample, certain definite conclusions seem possible concerning the phenomenon of daydreaming. Although almost all persons may daydream to some extent daily, the frequency and content of their daydreaming vary widely. Most daydreams appear to represent attempts at problem-solving in the interpersonal sphere and are fairly concrete and limited in time perspective. Fears and anxious personal or social concerns and imagery occur but with somewhat less frequency than do wishful or problem-solving fantasies. The frequency of reported daydreaming behavior seems to decline somewhat with age from the late teens to the fifth decade. While marital status, sex, education (above high school level), and number of siblings do not appear to be associated with daydream frequency, there are indications that rural- or urban-reared *S*s daydream more than *S*s reared in the suburbs. Daydreaming frequency is associated significantly with a measure of Creativity in spontaneous story-telling. *S*s who show greater daydreaming frequencies appear to be generally more closely identified with their mothers than with their fathers.

An exploratory study of this type obviously raises more questions than it answers. It seems reasonable to conclude that a fairly direct approach by questionnaire such as that employed in this study can be fruitful. The range of responses suggests that people responding to a questionnaire will reveal considerable material concerning their private daydreams and admit to some thoughts that one might expect only a clinical relationship could elicit.

Particularly interesting are the findings that sociocultural group differences in frequency of reported daydreaming exist and that *S*s who seem relatively more closely identified with their mothers than with their fathers report greater daydream frequency and also manifest greater creativity in writing stories.

One may speculate that the resort to daydreaming as a mode of human response is a learned skill fostered under certain conditions of the family constellation and cultural milieu and impeded under other conditions. It seems likely that it is closely related to development of language skills which in turn depend, in addition to constitutional endowment, on the opportunity for close identification with and stimulation from a nurturing adult (5, 7). To the extent that the mother's role temporally precedes the father's in the child's life space and also involves emphasis on story-telling, reading, cultivation of control rather than action or work, one might suspect that greater closeness to the mother would lead to greater daydreaming capacity in the child. In cultures in which the mother's role in the family hierarchy is more prominent one might expect greater development of introspectiveness and the more frequent use of the ideational dimension as a behavioral medium. This finding gains support from the present study insofar as Negro and Jewish *S*s report greater daydreaming frequency that do Anglo-Saxon *S*s whose family structures are somewhat more patricentric.

At the same time the effect of certain ongoing cultural patterns that move beyond the immediate family constellation cannot be overlooked. The Jewish culture with its stress on education and introspection, legalistic and logical reasoning, and achievement values undoubtedly fosters acceptance of and attention to internal stimuli as a mode of dealing with the world. Jewish male *S*s in this sample were the only ones who reported a significant tendency towards daydreaming even in the company of other persons. Yet both Negro and Jewish cultures also represent upwardly mobile, somewhat insecure minority groups, and the combination of a possibility of better things with the awareness of obstacles may present a fertile ground for daydream development. Further study with sociocultural groups to test this possibility is under way.

F. SUMMARY

As part of a general investigation of the psychology of daydreaming and imagination a questionnaire was developed to elicit information concerning patterns of daydream activity and listing specific daydreams. A total score relating to daydream frequency was derived from responses for correlation with other variables. The questionnaire was administered to 240 college and graduate students in an initial effort to obtain indications of the generality and content of daydreaming behavior in normal adults. Analysis of the results suggests that daydreaming is a universal phenomenon for this sample with, however, wide individual differences in content and frequency. Most daydreams appear to represent efforts at problem-solving in interpersonal

situations with fairly concrete goals and limited future perspective. Fearful content occurs as well as wishful or problem-solving themes but not as frequently. Daydreaming frequency declines with age from the late teens through the fifth decade. Except for rural-urban origin, background factors such as marital status, sex, education, and number of siblings did not appear related to reported daydream frequency. Frequency of daydreaming was significantly related to creativity of spontaneous written stories and daydreams and to greater relative identification with mother than father. Sociocultural group differences in reported daydream frequency also emerged. Daydreaming appears to be a fruitful area for research in personality and seems best viewed as a skill learned under certain patterns of family attitude and fostered or impeded by certain sociocultural group values.

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KINAESTHETIC DISCRIMINATION: THE DIFFERENCE LIMEN FOR FINGER SPAN*

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A. INTRODUCTION

Authors assign high rank to kinaesthesis among the senses but affirm that little is known about it except for the judgment of lifted weights. This gap in knowledge continues to exist, the literature containing only three studies of kinaesthetic acuity.

Jastrow (1886) reported DLs of 1/100 in judging differences between two blocks successively grasped between the fingers. Langfeld (1917), using a three-category constant stimuli design with six *S*s judging caliper separations of 48 to 52 mm. against a standard of 50 mm., obtained DLs of 0.45 mm. for his two most reliable *S*s, other *S*s showing considerable variability in precision. Gaydos (1958) employed the method of average error in experiments using aluminum cylinders of 17.7 to 100.0 mm. in length as standard stimuli which *S* grasped between thumb and forefinger, and to equality with which he then attempted to adjust a variable apparatus. Two trials each were given for settings greater than, and less than the standard. The PE of the distribution of average settings increased with the absolute length of the standard and the ratio of PE to I (the standard) was constant over a range from 35.4 to 100.0 mm. A constant error in the direction of settings greater than the standard varied with the size of the standard.

B. METHOD

The present experiments were undertaken in 1957 to obtain information in connection with a project involving conditions affecting kinaesthetic space perception. Stimuli consisted of aluminum rods of varying length. A grooved wooden block served as stimulus holder and assured accurate placement, and a rubber mat to receive the stimuli between trials insured noiseless handling. A cloth screen with a slit through which *S* inserted his hand occluded vision of the apparatus.

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Eleven *S*s were given two hours training and then completed the experimental judgments in six hour-long sessions. The method of constant stimuli was employed in three series using standards of 50, 30, and 10 mm. The standard was centered within a series of eight equally spaced comparison stimuli differing by steps of 1.0 mm. for the 50 mm. series, 0.5 mm. for the 30 mm. series, and 0.125 mm. for the 10 mm. series. This arrangement permitted the use of two categories of response, "smaller" and "larger," judgments of "equal" not being permitted. It was thought that if *S*s can be truthfully told that there will always be a difference between two stimuli to be compared, instruction to guess when uncertain should be less objectionable.

Each comparison stimulus was presented with its standard 50 times, requiring 400 judgments around each standard in a predetermined random order of presentation. *E* placed the standard on the block while *S* extended thumb and forefinger of his preferred hand and quickly moved them together until their tips touched the faces of the bars, again separating them while *E* substituted the comparison stimulus for *S* to grasp and report his judgment. *S* was encouraged to work rapidly, but was permitted to establish his own pace and rhythm. A rapid sequence of presentation and judgment ensued, allowing longer pauses between pairs than between members of a pair for recording responses. Two series of 100 judgments separated by a rest of 10 minutes were made in an experimental session of one hour. If *S* blocked on a judgment, the pair on which he blocked was repeated later in the series. Few cases of blocking occurred, and none of the *S*s found the pace tiring.

C. Results

A straight line was fitted to the data by the method of least squares (Woodworth and Schlossberg, 1954, p. 207). The probable error (PE) and mean (M) of the distributions were calculated for each *S*. The PE serves as a measure of sensitivity having the approximate significance of a difference limen (DL). The difference between *M* and the value of the standard (I) is an estimate of the constant error (CE), and the Weber fraction is given by the ratio PE/I. Table 1 presents these results for the three experiments and their averages, as well as corresponding averages for Langfeld's and Gaydos' experiments with the 50 mm. standard. Langfeld's PEs were calculated from *h* values in his tables by the relationship $PE = .6745 \times .7071/h$. A one-tailed test with 49 degrees of freedom was used to evaluate the significance of CEs since the CE is a directional error and the standard was judged 50 times with the variable series.

TABLE 1
ACCURACY OF FINGER SPAN JUDGMENTS AROUND THREE STANDARDS

	Standard = 10 mm.			Standard = 30 mm.			Standard = 50 mm.		
Subject	CE	PE	PE/I	CE	PE	PE/I	CE	PE	PE/I
Ho	—.41**	.535	.054	.12	.753	.025	.35**	.951	.019
Gh	—.10*	.429	.043	.00	.649	.022	.63**	.987	.020
Ma	—.16*	.614	.062	—.31**	.763	.025	.22*	1.012	.020
Ko	.68**	.763	.076	1.13**	.753	.025	1.91**	1.547	.031
St	—.02	.637	.064	.49**	.541	.018	.40**	1.045	.021
So	.30**	.672	.067	.57**	.747	.025	1.22**	1.22	.024
Co	.39**	.449	.045	.59**	.647	.022	1.01**	1.016	.020
Ha	.31**	.643	.064	.36**	.858	.029	.99**	1.012	.020
Wi	—.04	.485	.049	.03	.730	.024	.63**	.670	.013
Sm	.21**	.368	.037	.19**	.582	.019	.05	.778	.016
Li	—.21**	.400	.040	.00	.258	.009	.15	1.030	.021
Ave	.085	.545	.055	.288	.662	.022	.696	1.023	.020
Average of Langfeld's two best *S*s							.07	.870	.017
Average of Langfeld's six *S*s							.17	1.079	.022
Average of Gaydos' three experiments							1.00	1.347	.027

* Significant at 5 per cent level.
** Significant at 1 per cent level.

D. DISCUSSION

Our results and those of authors cited indicate a lawfulness in the capacity of human *S*s to perceive spatial differences by means of kinaesthesis similar to that found in other modalities and keener than is ordinarily thought to be the case. In spite of professed uncertainty regarding their judgments, *S*s were able to discriminate differences of 1/50th of standards set at 50 mm. or 30 mm., and 1/20th of a standard set at 10 mm. At all three levels wide individual difference occurred, the least sensitive *S* yielding a PE from two to three times that of the most sensitive. These differences seem to be in sensitivity and not due to carelessness.

It is notable that in spite of important differences in psychophysical procedures, the average results of the three experimenters turned out so similar for the 50 mm. series, which provides data for comparison. Average PEs for Langfeld's *S*s, for Gaydos' experiments, and for the present study were 1.079 mm., 1.347 mm., and 1.023 mm. respectively. The performance of Langfeld's best two *S*s was exceeded by two *S*s in the present study, showing some *S*s to have unusual kinaesthetic acuity.

It may be argued that the method of adjustment employed by Gaydos is inherently more difficult, containing more error variance, than the method of constant stimuli employed in the other studies, in which case differences between mean PEs obtained by the two methods should differ significantly. The method of constant stimuli provides a positive stop in finger apposition in both the comparison movement and the cue-giving movement, while in the method of adjustment the first movement is positively stopped and the second requires an adjustment of the fingers in free space. The latter also requires a shift in the position of the hand from the stimulus to the apparatus used for measuring the judgment. A test of significance for the difference between Gaydos' and the present experiment may be made by the ratio: F = larger variance/smaller variance, calculable from the data and yielding a value of 1.50. A question, however, arises as to the basis for evaluating this result. If we regard the variance as due to 50 and 11 *S*s in the two experiments, F does not reach significance at the 5 per cent level. It seems reasonable, however, to regard the variance as due to the large number of judgments constituting independent measures of the limen, i.e., the total number of judgments in Gaydos' experiment and the total number of comparisons of the standard with the variable series in the present experiment. In this case the difference would be regarded as highly significant. The latter conclusion seems consistent with the notion of the greater complexity in the operations of adjustment as compared with those involving direct comparison of successively presented stimuli.

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A NOTE ON THE RELATIONSHIP BETWEEN PER CENT ALPHA TIME AND EFFICIENCY IN PROBLEM SOLVING*

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A. PROBLEM

Electroencephalographic data, specifically alpha rhythm, have been related to a variety of psychological factors including cognitive functions and temperamental characteristics. In the cognitive area relatively few positive relationships have been found (Ellingson, 1956) and few studies have concerned themselves with the relationship between E.E.G. data and the performance of normal adults on complex tasks. For example, in the area of intelligence, Mundy-Castle (1958) points out that "there have been only two attempts at correlating intelligence with E.E.G. phenomena (in both instances using only Alpha frequency) among normal adults." He also says that the general assumption that there is no relationship between intelligence and E.E.G. data "rests on inadequate experimentation." Since it is likely that a similar assumption might be made with respect to other areas of cognitive functioning, it is the purpose of this paper to present an empirical relationship, obtained in an exploratory study, between per cent alpha time and efficient problem-solving behavior among normal subjects. Notwithstanding the fact that neurophysiological and other factors that might be involved in this relationship are presently unclear, the data are presented because they are sufficiently suggestive to warrant further research.

B. METHOD

1. *Subjects*

Thirty-three subjects participated in this experiment. Twelve of them were Ph.D. chemists employed in an industrial research organization. They ranged in age from 26 to 41 years and their mean age was 33.75. The remaining 21 subjects came from the University of Chicago. Nineteen were graduate students (16 in Physics, two in Mathematics, and one in the Social

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Sciences) and two were Research Associates (Ph.D.'s) in Physics. They ranged in age from 18 to 29 with a mean age of 23.24 years. For each of these subjects problem-solving data and E.E.G. records were obtained.

2. *Apparatus and Procedure*

The problem-solving apparatus was developed by John and Rimoldi (John, 1957). Since the apparatus and procedure have already been described at length elsewhere (Blatt and Stein, 1959), a brief statement will suffice for our purposes here.

The apparatus allows for the investigation of a subject's capacity to derive and integrate a series of logical relationships. The subject is presented with a panel which contains a circular array of nine lights and a center light. Next to each of the outer lights is a button which, when pressed in the correct time sequence, lights up its corresponding light. The button press is also automatically recorded on a tape so that a permanent record of the problem-solving process is available. The center light does not have an activating button and it is the subject's task to learn the *one* sequence of three buttons at the bottom of the circle that will light it.

Three types of relationships exist among the lights which correspond to the following formal statements: (*a*) if A then B; (*b*) if A and B then C, and (*c*) if A not B. Where any of these relationships might exist they are indicated by arrows on a disc that is placed between the circle of lights. Before the subject can light the center light, he needs to learn which of the above relationships do, in fact, exist. He may do this by asking questions of the apparatus by manipulating the buttons and observing the results and/or by inference.

The efficiency of a subject's problem-solving behavior was defined in terms of the smallest number of unnecessary questions asked before he lit the center light or before the alloted time, one hour, expired. Three types of unnecessary questions were specified: (*a*) Redundant questions—those that had been asked before; (*b*) Non-abstract questions—those that had not been asked previously but which yield information that could have been inferred from prior information; (*c*) Unique questions—those that the subject did not ask previously and which did not convey any new and direct information. The total number of unnecessary questions was then correlated with the E.E.G. data.

Electroencephalographic records of one hour duration were obtained on eight-channel recorders. Calibrations were standardized to obtain a 6 mm. deflection for 50 microvolts input. All records were taken in a darkened room under quiet conditions, the subject relaxing with his eyes closed. Bi-polar leads were employed to obtain a complete coverage of the cortex. Data for this study were taken from the left temporal-occipital leads. Alpha rhythm was defined as having a frequency of 8-13 cps. and per cent alpha time was based on the amount of time alpha was present in a 120 second sample of the record.[2] This sample was obtained 10 minutes after the beginning of the recording session. Bursts of alpha activity were included in the count of per cent alpha time only if at least three waves were seen in succession. Portions of the record in which cortical activity at a frequency higher than 13 cps. were superimposed on alpha activity were not included in the calculation of per cent alpha time. Ten of the 33 records were scored independently by both authors and a reliability (rho) of .94 was obtained.

C. Results and Discussion

The problem-solving efficiency scores ranged from 4 to 104 with a mean of 56.38. The per cent alpha time ranged from 0 to 95 with a mean of 40.91. The rank order correlation (corrected for ties) between problem-solving efficiency and per cent alpha time was —.47 ($p = < .01$, one-tailed) (Siegel, 1956). The more efficient problem solvers tended to have less alpha in their resting E.E.G.'s than did the less efficient subjects. Since our total population of subjects included individuals that differed widely in age (18-41) it should also be noted that age did not correlate significantly with either the E.E.G. data (rho = .27) or the efficiency score (rho = —.28). It is beyond the scope of this note to present neurophysiological interpretations of the data. However, there is general agreement in the literature that suppression of alpha in the normal subject is related to a state of "arousal" or increased attention to external and possibly internal stimuli (Jasper, 1958). We might speculate, therefore, that the more efficient problem solvers in this experiment may be operating with a generally higher level of "cortical excitation" and are consequently in a state of readiness to integrate external information or information which is "stored" in the cortex.

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CHEMICAL STUDIES OF BEHAVIOR: V. PROCEDURES IN DRUG EXPERIMENTATION WITH COLLEGE STUDENTS*

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G. R. WENDT AND JEAN S. CAMERON[1,2]

A. INTRODUCTION

This paper serves as the introduction to a series of papers describing our experimental results in various drug studies. In addition to describing procedures, we have set down some of the rationale for them.

Drug studies with humans are not easy to conduct and are subject to a number of safety and public relations hazards as well as to the hazards of biased data or insensitive methods. We feel that we have now attained enough experience to justify a second purpose for this paper: to pass on to others an account of methods which reduce such dangers. We regret that space limitations have forced us to treat many important topics far too briefly.

This paper is based on our experience in drug research using about 3000 students as subjects. Some use is made of experience in drug experimentation with hospitalized patients and of experience in other than drug research when procedural problems are similar. Part of what is said here is applicable to other research with humans.

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* Received in the Editorial Office on October 3, 1960, and published immediately at Provincetown, Massachusetts. Copyright by The Journal Press.

[1] The opinions expressed in this paper are our own. We have had many collaborators but do not wish them to feel responsible for our convictions. We have made few references to literature. The procedures and opinions here described grew out of our own experience rather than from that of others. A few references are given for the convenience of readers who may be new to the field.

[2] Financial aid for our studies has come from a number of sources additional to the universities employing us (Rochester, Wesleyan, Yale, *et al.*). For several years we have been trying the procedures here described. During this period the G. D. Searle Co., Wallace Laboratories, and an anonymous grant coming to us through the Woodard Research Corporation have been our main supports. During the period 1950-56 (when we learned much from our mistakes) support came from the Office of Naval Research (Contract No. ori-126, T.O.1) and the National Institutes of Health (Grant No. M-681). The beginning of the principles set forth here were made while GRW was a Fellow of the National Research Council, 1930-32. They were later further developed during laboratory studies of motion sickness supported by the Committee on Medical Research, OSRD, and by Eli Lilly Co. JSC has been collaborator on all studies since 1950.

The materials in this paper are based especially on work of the past three years[3] during which methodology has been a primary concern. In each experiment the drugs used were small doses of such common drugs as dramamine, benzedrine, meprobamate, aspirin, phenacetin, and caffein. Each experiment had five objectives: (*a*) to determine the immediate effects of several common drugs on mood, emotion, and motivation; (*b*) to relate the amount of the drug effect to personality variables and other personal or environmental variables; (*c*) to study causes for day-to-day variations in drug effect; (*d*) to study inter-relations of moods, emotions, and motivations; (*e*) to develop efficient, valid, and trouble-free methods for psychopharmacological research. We have found multi-purpose experimentation economic and rewarding.

The major criterion measures for assessing drug effects were adjective check lists (see pages 205, 207) requiring that the subject make an introspective evaluation of a number of moods, emotions, and motivations. Such introspective reports maximize the need for control of subject attitude. We feel that we have been able to do this as shown by consistent and intelligible results with drug doses as small as 10 grains of aspirin. In most cases we have eliminated the so-called "placebo-effect" in that our measures showed no important change after placebo but did change after drug.

It will be helpful to the reader if we insert here the schedule used in our most recent experiments (described in detail on pp. 194-6, 202-8). Each of 36 subjects served on each of 15 sessions, the sessions being separated by two or more days. On each day the subject came twice, once in the late morning, when he filled out report forms, completed an adjective check list, and took his medication; again two hours after medication, to report on the two "out-patient" hours and to fill out adjective check lists. All subjects took placebo on the first two sessions (subjects "blind") and placebo or drug on the next 13 sessions (modified "double blind"). Subjects were on different drug sequence schedules and were allowed to start on different dates within a two-week period.

Consistent success in drug research with humans requires close attention to many details, but the central problem is that of establishing and keeping the right attitudes on the part of the subjects. To accomplish this there must be sensitivity to each subject's needs, thoughts, and feelings and close attention to the human relations involved. There needs to be an attitude of mutual respect coupled with friendly cooperativeness and mutual interest in the work and in one another. The means of achieving these attitudes differ somewhat depending on the population from which the subjects come and on whether they are seen only once or repeatedly and whether they are seen singly or in groups. The central problem of subject attitude is mentioned at this point because it becomes an underlying objective in each aspect of methodology described.

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[3] Priscilla G. Specht was collaborator for two years, Eugene Sachs for one. The results of these experiments are being reported separately.

B. Legal Liability Considerations

1. *Introduction*

Since we have never had an accident or any troubles of more than minor (and often amusing) consequence in our work with students, the contents of this section are without benefit of unpleasant experience. After years of advisory conferences with lawyers, we are aware that our summary of considerations cannot have their unanimous concurrence. Rather, it is a commentary for drug investigators based on the evolution of our procedures which have kept us out of trouble. The section acquires meaning in the light of the following ones giving detailed descriptions of procedures.

Subjects could start legal action because of real or imagined physical or emotional damage attributed to an experiment, or because of personal or property damage, e.g., an automobile accident, blamed on the experimental procedures. The time to stop such suits is during the planning and conduct of the experiment, not after a subject has threatened to sue. Procedures and rules of experimentation which are safe, subjects who respect, trust and like you, and constant alertness to head off troubles will make it highly unlikely that the need or desire to sue will arise.

2. *Who is Liable?*

A quotation from a lawyer may be helpful: "Specific facts of specific cases are the basis of all court actions and therefore generalizations about legal liability in this situation are of little value." There are both federal laws (21 USCA § 355), state laws, e.g., New York Education law § 6801 [256] and § 6809, and possibly local laws which apply. There will also be executive regulations. Some of these laws and regulations appear to defy a layman's interpretation as applying to our kind of work. Nevertheless it is well to obtain copies of pertinent statutes and regulations. We get the impression that questions of liability are in a sort of legal "no man's land."

Our comments are an attempt at a common-sense approach, made in the hope that those most involved (investigators, research institutions, sponsoring agencies, drug companies) will take our suggestion that there is an urgent need for clarification of their joint responsibility (3).

Section 505 of the Federal Food, Drugs, and Cosmetic Act provides that only qualified experts may administer an *experimental* drug. To qualify as an "expert" one merely signs a Statement of Investigator asserting one's expertness. There is probably an implication that one has claimed expertness on the pharmacology and toxicology of each drug used. It is to be hoped that the Courts would not interpret this strictly, since it is likely that most investigators of new drugs have gained their "expertness" on a particular drug from the data furnished by the drug manufacturer. Investigators have a right to ask the manufacturer that the Statement of Investigator not release him from prior responsibility for conservative advice.

When using drugs other than experimental ones (prescription items, proprietary medicines) applicable laws or regulations are unknown to us and perhaps also to the very numerous other investigators who have long worked in this field. At some future time we hope for the leisure to pursue these questions.

It is likely that most manufacturers have not faced the problem we present, of the greater liability in administering drugs to college students than to patients. They should never recommend a drug for such tests unless they feel sure of its safety. In addition to the normal animal screening procedures, the pharmaceutical manufacturer should obtain adequate data on humans (patients, prisoners, etc.) before allowing use of the drug on students.

If a suit over damages is started, it is possible that the defendants may include (*a*) the institution in which the research is done, (*b*) the investigators, (*c*) an agency which provides financial support for the work or (*d*) the pharmaceutical manufacturer. We will make a few comments about each.

a. The institution might be the first target, as might be the case with a radiation biology experiment causing damage or a chemistry department explosion. It may be equally true for research in human physiology, pharmacology, or psychopharmacology. We believe that there is actually no greater risk in drug experiments with college students than the institution assumes in many other aspects of its research or other operations. If court judgments should occur, they ought to be covered by the institution's normal accident and liability insurance and not require special insurance. We are told that our university's accident insurance coverage would pay damages to subjects *even when no legal liability to pay damages exists.* Such coverage is a great comfort to both subjects and investigators, especially when matched by insurance of the investigator, the drug manufacturer, and the sponsoring agency. The investigator has an obligation to keep responsible officials (treasurer, director of research, dean, college physician) informed of the general nature of the work. These officers should restrain any tendency to interfere unreasonably with the investigator's freedom to choose and conduct his research.

b. The responsible investigator of our kind of research may be more likely to be named defendant than is the research worker in physics or chemistry. He should carry an adequate amount of professional liability insurance *containing a clause covering drug work with humans.* If the investigator is not a licensed physician he may wish to associate himself with one who is willing to share responsibility. This *may* help to establish the legal requirement for an expert. Sometimes non-medical investigators ask their project physicians to write "prescriptions" for the administration of experimental drugs. We doubt that this would have any legal standing as a release of responsibility, but it does supply evidence that the physician knows what is being done. We have stopped this practice since it might unfairly penalize the physician for his cooperativeness.

We do not know whether the investigator's assistants would be held liable. Specific circumstances would probably determine this.

c. The federal government subsidizes a large amount of drug research on a contractual or grant basis. At present federal agencies are not sharing responsibility. Universities should ask that contracts and grants for drug research on humans contain clauses by which the contracting or granting agency shares "third person liability" with the university. Such clauses are rare and unsatisfactory in other research contracts, e.g., Department of Defense contracts. Federal agencies which make grants for research based on a request initiated by the investigator, e.g., National Institutes of Health, at present neither have nor assume liability. We feel that in instances where the Congress or federal agencies have earmarked funds for specific and possibly hazardous research, e.g., psychopharmacology, radiation biology, a mechanism is needed for indemnifying the research worker and his institution for losses from possible court judgments. If the public interest requires that such research be stimulated, then the public should share the risk with the investigators. *New federal legislation is urgently needed for this purpose.*

d. The pharmaceutical manufacturer is under an obligation to conduct enough tests to find the safety of a new drug, to formulate proper directions for its use, to name contraindications to its use, and to supply pure drugs. (There is no evidence known to us that they assume responsibility beyond this). The extent of obligation for conservatism will vary with the degree of novelty of the drug. Unfortunately, at present the manufacturers do not have a publicly stated policy. Instead of a standard agreement there are often only verbal understandings as to liability, or even no understanding at all. This situation seems to be crying for a solution. A single widely publicized court case could frighten many investigators away from drug research with humans. It is likely that the liability insurance of some manufacturers is written so as to cover the outside investigator. This policy should be encouraged. These organizations are in business for profit and should not expect non-profit outsiders to carry all of the risk.

3. *Should One Ask the Subject to Sign a "Release"?*

It is our prediction that a signed statement by a subject, releasing the investigators from liability, would have little legal standing. Asking subjects for such a release is likely to be harmful; it persuades them that the work is dangerous and may even invite suits. We ask only for a signed statement of *willingness* to serve as a subject. After our project and its rules have been orally described to a group of prospective subjects, those who wish to be considered as subjects do so by signing a statement such as:

> I wish to serve in the 1958-59 studies of the effects of drugs on emotion and motivation being conducted by Jean S. Cameron, Priscilla G. Specht, and G. R. Wendt.

4. *It is Best to Work Only with Subjects Over 21*

If they are younger, write to the parents telling them what you are planning to do and asking whether they object. Do not ask for a release; tell them that their reply does not absolve you from responsibility.

5. *Financial Reward*

We do not refer to money given to a subject as remuneration or pay. We give it in cash covered by a signed form such as:

> This acknowledges receipt of \$——— given in recognition of service as a subject in an experiment on———(title of experiment)——— performed on———(date)———.

There are many laws which regulate wages, salaries, and conditions of remunerative work, few of which are compatible with paying wages for taking drugs. When a payroll office has objected to not treating it as payroll, we told them that the relation of subject to experimenter is a relation *sui* *generis,* i.e., not an employer-employee relation, and that we regard the money as a gift or incentive comparable to the food we give a rat at the end of a maze. (On the other hand, the subjects are probably obligated to report such money as taxable income under federal and state tax laws.) Whether or not this is legally defensible in all states is open to some question. It is quite possible that laws cannot always be reconciled with public or scientific necessity.

6. *Information to Subjects*

We tell our subjects any or all of the matters discussed above, and in addition describe for them how they might be tempted to sue us for an automobile accident, even though it were not our fault. We believe that such candor is a protection rather than an invitation. This is always coupled with a reminder that the drugs are safe so long as the subjects obey the rules they have agreed to abide by (see p. 208).

C. AN ASPECT OF OUR RESEARCH PHILOSOPHY

Before the reader continues, an aspect of our research philosophy will be mentioned briefly. Some psychologists may have difficulty in reading this paper sympathetically because we do not put primary emphasis on the hypothetico-deductive statistical approach to science which is currently a common preference. Instead we work more in the tradition of research in physiology which may find statistical tests of significance of differences only an adjunct consideration in evaluation of the goodness of data. They may become unnecessary when enough other proof of the "goodness" of an experiment is obtained. If there is doubt of the goodness of data the experiment is repeated before publication.

The criteria (other than statistical) which we use in judging goodness of an experiment include at least the following. It is our *opinion,* based on considerable experience, that we make fewer errors of finding or failing to find results than we would if we relied mainly on statistical tests.

1. Do the investigators feel that the experiment was well executed and that no extraneous factors biased the data?
2. Are the results of the experiment credible in the light of all of the auxiliary information available about the subjects?
3. Do the results show internal consistency and do they yield a believable pattern?
4. Are the results consistent with expectation?
5. Do the internal controls show that the experimental procedures

produced valid results? In our recent experiments we used two control measures, placebo and dramamine. These controls are dispersed among the data in the same way the experimental drugs are dispersed. If we obtain negligible changes under placebo and substantially the same response to dramamine obtained in our numerous previous studies of this drug, then we may infer that the remaining drug data have some validity. (The rationale is similar to that involved in testing a weighing scale by placing known weights on it. If it indicates these weights correctly, one assumes that it measures unknown weights correctly.) In our recent experiment, 8 out of 13 drug variables were being repeated from our earlier work, thus yielding enhanced validity for the five new variables. [A more exacting use of this method is described elsewhere (2).]

6. Is the obtained result of such practical or theoretical importance that extra precautions need to be taken? (In recent years we have twice chosen not to trust data which *had* attained statistical significance, because we believed the consequences of publication too important to risk error and because one of the above criteria was not satisfied. In both, large scale repetition of the experiment failed to confirm the first, statistically reliable finding.

One of us (GRW) has written at some length on closely related problems (9, pp. 52-63).

D. Choice of Experimental Setting

1. *Individual Testing vs Assembled Testing*

After considerable experience with a variety of settings for the taking of data we have come to a preference for the "out-patient" setting and modified individual testing. By "out-patient" we mean that the subjects go about their ordinary business except during the report periods. We have our *S*s come separately, at approximately five-minute intervals, for a stay of 10 to 20 minutes. Separate arrival time is essential because *S*s who come together find it difficult to break their personal relationship in favor of one to the experimenters and to the requirements of the experiment. Our room is large so that a number of *S*s may be present at once and still be partially socially insulated from one another. The spaced arrival times give the *E*s time not only to form a personal relation with each *S* but also to use adequate care in getting him started and checking his reports before he leaves. Our laboratory location happens to require that the *S*s climb 100 steps to get to it. We believe this an advantage in giving time to get into an experiment-directed attitude instead of the heterogeneous attitudes of their preceding activities (classes, bridge, etc.).

When *S*s work in groups the group atmosphere and the interactions of each *S* to others often become greater factors influencing behavior than is the drug effect. The amount of group effect is enhanced if the *E*s are too permissive. Groups are of two kinds: structured groups, where the effect of drugs on social behavior is the subject of investigation, and assembled groups, where a number of *S*s are brought together at the same time for the investigator's convenience but the *S*s work as individuals. In either of these settings, but especially the former, the *S*s relate more to one another than to the *E*s. Group testing maximizes many sources of bias, including placebo effects.

2. *"Out-Patient" vs "Custodial" Settings*

We believe that studies requiring custodial care of college students often give comparatively invalid data. Tests of dangerous drugs or high dose levels are better confined to institutionalized subjects or to studies by self-medication of the investigators.

This is not to say that subject custody should always be avoided. When used, precautions are required to maintain naturalness of environment since college students can easily dramatize such situations, use them as an opportunity for horseplay, or become bored and uncooperative. Obviously the investigator must resort to use of the custodial setting when investigating drugs with prolonged dangerous effects, e.g., mescaline, marijuana, some barbiturates. In such instances it is necessary to keep the *S*s in the laboratory until the behavioral effects of the drug become negligible.

3. *Special Considerations for Subjects to be Used only Once*

Some experiments, e.g., effects of drugs on motion sickness, are better conducted by using each *S* only once. Because it is not economical to take the time to get to know each *S*, one must work for the best possible standardization of attitude, both prior to *S*s' arrival at the laboratory and during the period of giving instructions and conducting the experiment. It is apparently possible to achieve considerable success at this, as indicated in our earlier motion sickness experiments, especially in an unpublished study by Carson Johnson and G. R. Wendt. In this work the same experiment comparing placebo, hyoscine, dramamine, and histadyl was repeated five times with 12 *S*s in each drug group in each experiment (total of 240 subjects). Previous history of motion sickness was equated in each group. In the light of the fact that variation in attitude or expectation is known as an important source of variability, our finding that each of the five experiments gave substantially the same result seems to indicate successful standardization and control.

In the motion sickness studies the initial appeal to the *S*s was much like that used in our current drug studies (see below) except that it was more carefully devised and executed to assure comparability. It was designed to arouse the respect, interest, cooperation, and understanding of the subject and to convince him that his participation was important but would not require excessive sacrifice on his part.

When he comes to the laboratory after selection the handling of the one-time *S* should appear relaxed, informal, and spontaneous, but, in fact, be closely controlled. It is not difficult to introduce an *S* to an experiment in such a way that the *E* retains control of the *S*'s verbal behavior. In planning one's "patter" one needs to imagine in advance the usual stereotypes of social behavior and the *S*'s need for information. [Note: Try to visualize your room as the *S* will see it. Adapt your "small talk" to the major items that will attract (or distract!) his attention. Give information so that most questions on his part are precluded.] A sample of the *E*'s side of the conversation is as follows:

> *S* raps on laboratory door. *E* Hello. You've come to be a subject? *S*——— *E* Oh, yes. You are Carl Seward. Well. You are right on time! *S*——— *E* I hope you had no trouble finding this place. *S*——— *E* You're lucky—some do. (pause) This room must look pretty strange to you. *S*——— *E* Well, all that stuff is for some other research going on in here. One of the men is working on trying to find out what happens in the brain of a cat when it is subjected to motion. *S*——— *E* By the way, were you given your drug capsules? *S*——— *E* May I have the slip he gave you? Thank you. —Ah. Right on time. That's good. *S*——— *E* Our work today is going to be over here. That's our machine for testing motion sickness. (pause) *S*——— *E* Yes. I'm going to take about 10 minutes to explain it to you before we start work. Then, after we get through, we can take all of the time you want for questions and for talking about anything about our work that interests you.

The continuation of conversation and instructions is along similar lines. These always anticipate the *S*'s need for information and give it in such a way that his response is predetermined.

4. *Long-Term Subjects*

Since the remainder of this paper deals with procedures for long term *S*s, no extensive comment is necessary here. Such *S*s will have been seen at least twice before they come for their first session. Hence the initial task is to reestablish existing relations and let him see that you are relating to him as an individual. This contact is more demanding on the experimenter.

5. *Institutionalized Subjects*

We mention institutionalized subjects only for contrast. Our experience is limited to one study requiring single sessions for each *S* and two long-term studies where *S*s were under observation from eight weeks to two years. The patients and others we worked with (VA general hospital and VA domiciliary) are much less easy to control than are mature college students. Their varying needs (dependency, approval, aggression, etc.) are stronger and thus introduce individual bias (10) into data. Only by careful selection of subjects and by segregation into experimental wards can one hope to do work which allows control of the patient. Institutions, especially general hospitals, are unsatisfactory also because of the difficulty of obtaining simultaneous cooperation from nurses, attendants, ward physicians, dietitians, social workers, administrators, etc. Only when all influences on the subjects can be controlled and proper hospital discipline be maintained, should the investigator dare to expect good data.

E. STEPS IN THE CONDUCT OF AN EXPERIMENT

1. *Giving Information to Those Responsible for Student Welfare*

The investigators must perceive who needs to be consulted or informed about the experiment. At various times we have needed to obtain prior permission for experimental work, or, at least give information to individuals ranging from the Secretary of the Navy to individual faculty members. Usually the needs are more restricted, but in any case the investigator needs to think carefully about his local administrative structure and adapt his approach to each individual.

The office of the dean of students should always be kept informed. In asking for a conference we send a letter describing our research plans to key people responsible for student welfare. The letter refers to our previous work, tells how many students we will need and how often they will serve, their age minimum of 21, sex. We tell how we plan to select: that the dean and college physician will have an opportunity to review those selected. Our intended medications and doses are named, with some explanation of our interest and hopes. Our sponsors are described. We name our project physician who has previously cleared our plans.

The conference becomes the occasion for amplification and for questions of interest. We are able to go into detail, since the preliminary background is already established. We can describe how we pack capsules, how we take precautions against mistakes and accidents. A typical experimental session day is described. It is pointed out that this type of work can be a valuable learning experience for the students in self-understanding of mood fluctuations and day-to-day variability. We explain that this opportunity for improved self-understanding while taking medication occurs in a safe, controlled atmosphere with trained observers who will curb over-interest or self-dramatization as they work with and train the subjects.

2. *Letter of Invitation*

The letter below is a sample from one experiment. It went to students of 21 years of age or more. It is constructed on principles of effective writing. It should be noted that (*a*) truth is the best propaganda, (*b*) college students want a learning experience, (*c*) monetary reward should not be over-stressed.

February 10, 1959

Memo on need for subjects in a psychological experiment

For the purposes of a psychological experiment on the effects of a number of widely used drugs (of the general order of caffein, aspirin, etc.) we need a group of the more mature students on Campus. This memo is an inquiry as to whether you would be interested in having us consider you for inclusion.

The actual work would take about 15 minutes of your time (sometimes a little more) on each of about 40 occasions. The times selected for these 40 sessions will be quite flexible and can mostly be set to fit your convenience.

The work itself has in the past proved interesting to the subjects and a valuable learning experience about themselves. The experiment happens to be one of considerable public importance. It will be safe and pleasant. We have been successfully using college students for such work since 1928. While we could easily do our experiment on a volunteer basis, the fact that we have ample funds will make it possible to add a substantial monetary reward.

If you would like to meet to talk with us about it, please come to *either* of two meetings:

Monday, Feb. 16	4:00–5:00, Morey 108
Tuesday, Feb. 17	1:00–2:00, Morey 321

Please come promptly at 4:00 or 1:00 so that we can finish within the allotted time. If you are unable to come to either meeting, yet are eager to be included in the group, please fill in the attached form and return it to me. Those who are able to come on Monday or Tuesday should turn in the form at the meeting.

We are not giving you any details in this note for the reason that uniformity of subjects' attitudes is an important factor in most psychological experiments. We will tell you the nature of the experiment in detail when we see you. At that time you can decide whether you feel able to be of help to us.

Sincerely,

G. R. Wendt, Chairman
Department of Psychology

3. *The Initial Contact: Invitation Meeting*

The primary objective of this meeting is to place our contemplated research in a truthful reassuring background which enables each potential *S* to decide for himself that he can volunteer, what it is that he is volunteering for, and some of the possible reasons why he is willing to do so.

Telling subjects only the truth is the first and most important principle of good public relations. We tell our *S*s no falsehoods; we tell them as many factual details as possible; we explain to them the reasons for withholding certain items of information, e.g., the identity of the drugs used. Our college student *S*s are always told that placebos ("milk sugar") will be used. They are too mature, intelligent, and sophisticated to be treated in any other way. College students (and many patients) will point out the need for controls if such information is omitted.

The contents of this meeting are described here. Where quotation marks are not used, some of the language is nevertheless a close approximation to what is said.

a. Introduction. The responsible investigator begins the meeting with an informal introduction of himself and staff, including their previous experience with drug research. The purpose of the meeting is stated simply "to tell you what we are planning to do and to get some information about you which will be of help in picking the people who will actually work with us." We also tell them that we will give each of them one dollar for attending this meeting.

b. The historical background of the present research, mentioned in the letter (p. 16), is elaborated: what previous work led up to the investigators' present interest, how much has been done over a period of years with complete success in handling drug subjects.

c. Statement of proposed study. "It is the study of the effects, on you, of certain common medications. The ones we are now interested in are old and well known drugs, used by millions of people over a period of years, but, surprisingly enough, not properly studied for their psychological effects. Each of them is for ordinary daytime use by well people and may even be something you've taken."

d. Reassurance about terms: drug, medicine, medication.

(1). Reiteration of the safeness of previous work should be obvious reassurance. We are able to refer to 30 years of drug research involving 3000 subjects, some used repeatedly, with no incident of consequence. Here we include one or two anecdotes of actual incidents, such as the subject who came down with the popular version of intestinal flu but decided that his symptoms were caused by our medication, or the other subject who blamed us for failing an examination (our medication was supposed to have impaired his thought processes)—a good argument had he not been on sugar pills!

(2). They are told that all of them have been under the influence of "drugs" of potency comparable to those we plan to use: coffee, tea, cola drinks, aspirin, alcohol, tobacco. Also the production of physiological agents in states of anger, stress, fear—these have more dramatic effects than any we would use.

(3). "Reassurance as to procedures is more for our protection since our medications are harmless. (*a*) We avoid problems with your parents by having only subjects over 21. (*b*) We avoid problems with the College by having the dean of students and the college physician pass on your names. (*c*) We avoid problems with you, the subjects, by interviewing you, telling about the work, what we expect, what you should anticipate. (*d*) We clear our research plans and drugs with our project physician who decides whether our drugs are so mild that we need no individual medical examination (the decision for this year's work). (*e*) We provide a set of rules to protect our subjects from trouble. These are simple to follow and are based on just common sense. (*f*) Our medications are first carefully screened by our staff, all of whom have taken them in larger doses than you will get."

e. "Why you will volunteer." This summary is important. Good subjects need good reasons: that the work will not be a burden, it will be interesting, they will have an opportunity to learn something about themselves, including insight, self-honesty, mood variation, and its day-to-day shifts. Another reason is the value of the work—it is unique and important: present day fads in drug-taking need good research to pinpoint psychological effects and our laboratory is becoming known for developing detailed descriptions of the psychological and emotional changes produced by drugs. Lastly, becoming a subject will not involve much personal sacrifice in the nature of time, or financial loss. The time required is described by giving an account of the total experiment: the initial interview, the 15 drug session days, each requiring two 10-15 minute visits to the lab. The events of one such day are itemized: the first visit occurring between 11:00 and 12:00 at which time the pre-drug forms are completed and the medication taken, the second visit occurring exactly two hours later when the second set of brief forms is filled out. It is explained at this time that session days are not consecutive to prevent any day's effect carrying over to the next day. It is also a good idea for the investigator then to take sample capsules before the group. He should tell the group that one-third to one-half of the capsules, as the case may be, will be milk sugar. In addition we give a realistic prediction of how often they will be able to detect anything, how often pleasant, how often not.

We carefully explain what we mean by "no financial sacrifice" since we wish to avoid solely monetary motivation. We tell them that we make them a gift of $1.00 per day and that at the end of the experiment we will double this sum for all who complete the study. This "motivation to finish" concept provides an opportunity to describe briefly our complicated drug design schedule, that each subject follows a different sequence so that our final results for any one drug depend on all subjects finishing. The money is defined as a "token of appreciation" and definitely not as pay. Possible legal complications of regarding it as pay are explained.

f. In closing we define who should volunteer. This work is too important and complex to tolerate unconscientious subjects or those who have so many outside activities as to prevent fitting this work into their schedule. Each subject report requires close attention, honesty, regard for detail, and completeness. Our results can be only as good as their effort during the few minutes we see them on each visit.

After a question period we ask the interested ones to remain to fill out two forms (described below).

4. *Tests for Selection*

It may be unnerving for some readers to find that we depend only a little on psychological paper and pencil screening devices. We have cogent and practical reasons. We so far have not come across such testing instruments that do as well or better than our staff judgments.[4] It is our opinion that personnel in psychological work often sell themselves short in renouncing their perceptive skills in favor of popular well standardized instruments. If such available instruments do not answer what we need to know, it is impractical to use them. We need to answer one primary selection criterion: Can this potential *S* work effectively with our present staff to determine drug effects with our present methods? This question remains the same whether working with male college students, hospital patients, the aged, the normal or abnormal populations. It is more reasonable to train or acquire perceptive staff than to apply a standardized technic, which if optimistically capable of giving this answer, will not do so equally well for all populations.

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[4] We plan to make this the subject of a short paper, with empirical data.

At the end of the orientation-invitation meeting we administer two tests, an abbreviated form of the Minnesota Multiphasic Personality Inventory (MMPI) and a special-instructions form of one of our adjective check lists (ACL).

The MMPI is used for four reasons: (*a*) The lie scale is scored so that the extreme subjects *may be considered* for elimination. A high score is not used for automatic elimination. For example, in interviewing one young man who scored fairly high, it was evident that he told the truth, that he would not cheat his way into a movie theater and did believe in his own and others' honesty. On other occasions we realized that low scoring college students may be very adept liars, sophisticated in the need for truthful platitudes. (*b*) Secondly, we scored an anxiety scale to assure a tentative range (7). (The emotional continuum may vary with the investigator's interests.) We keep in mind that these anxiety scores are tentative in that our later contact may indicate changing the anxiety classification of some *S*s. The answers also afford possible interview considerations and later may be a factor in interpretation of results. (*c*) We include a 10-item health scale within the MMPI which is followed up in interview exploration. Most of these items inquire into the incidence of allergic responses. (*d*) Our fourth reason for giving the MMPI is to insert early in our subject contact an attitude correction factor. The college population by the junior and senior years is test-wise and test-weary. While they have been exposed to campus rumor of what psychological experimentation involves, they often have exaggerated and misinformed impressions of the mysteries of drug research. The reaction of "one of those things again" helps to reassure the prospective subject and dissuade the hopeful thrill seeker.

The second test administered at this time is our regular ACL, (later used in drug effect evaluations), but with special instructions as used by Gough (6). They are asked to select those adjectives reflecting generalized self-concept rather than momentary mood variation. The frame of reference is, "We want to know which ones (adjectives) often apply to you." This report can be used in two ways: (*a*) As a screening device. We cannot effectively obtain data from subjects checking either a very small or very large number from the total 130 adjectives. A subject checking only three or four or another checking 100 will probably not reflect drug effect shifts between the pre-drug list and the post-drug list. (*b*) As a basis for interpretation of data on individual differences in response to drug.

We end the ACL by asking the subject to list adjectives reflecting those good and those undesirable feelings least and most often characteristic of him. Previous interpretation of data indicates this to be a relevant factor, e.g., a very active, ambitious person places a low value on being relaxed and quiet. A tense, somewhat anxious person may regard this state as desirable.

5. *The Selection Interview*

One goal of this interview is to reach a conclusion as to whether a particular potential subject can work effectively with our staff and by our methods. When it is obvious early in an interview that a person is unsuitable we nevertheless continue for a polite amount of time and tell him by letter that we were not able to use him. We always interview substantially more than we will need. The *S*s understand that we will select those who best fit our requirements. (An adequate explanation of what to look for, either positive or negative, cannot be included in this paper.) The length of interview ranges from 30 minutes (*S* to be rejected) to three hours. It is usually conducted by one person, but we also feel free to have two or even three experimenters at once.

We use a free, open-end, conversational interview procedure because the constraints of a standardized interview waste time and are a barrier to rapport. The free procedure is also better for a second goal of the interview: to establish in the person those attitudes which will make him a good *S*. In this type of interview there is no prescribed sequence of areas, e.g., Areas I. A and B may come in the middle of an interview. They may be introduced by, "Tell me about your family." What the *S* then volunteers may produce information not only on the area of family, but also on several other areas. A few interview areas, e.g., use of medications, must be handled by explicit questions.

The outline which follows is a mixture of both information items and goals. Within the framework outlined below the interviewer must perceive the need of shifting emphases for each individual or for new areas of exploration needed to understand a particular *S*.

Pre-experiment Subject Interview

(Areas and Goals)

I. Brief exploration of biographic information
  A. Place of birth, childhood, early education
  B. Family make-up
    1. Parents
      a. education
      b. occupation
    2. Siblings
    3. Closeness of family unit
  C. Present status
    1. Field of concentration in college studies
    2. Single, married, engaged
    3. Extra-curricular involvement
    4. Occupation plans and aspirations
    5. Problems
      a. academic
      b. social
      c. emotional
      d. financial

II. Contraindications for becoming a subject
  A. Medical history of individual
    1. Kinds and frequency of illnesses
    2. Medication habits and attitudes
      a. Self medication for colds, headaches, other minor ailments
      b. Does the person baby himself
      c. Use of caffein beverages, tobacco, alcohol, amphetamines, others
      d. Attitudes about other people's use of drugs
  B. Parental attitudes
    (Cover same material, A above)
  C. Personality contraindications
    1. Wrong motivation in volunteering
      a. thrill seeker
      b. exclusively monetary objective
    2. Inaccessibility, either by inability for introspection or by inability to be drawn out by questioning
    3. Psychiatric disorder
      a. is person presently in therapy (not ordinarily disqualifying)
      b. paranoid, depressed personality, etc.

- c. psychopathic tendencies
  - 1. negativism
  - 2. "wise guy"
  - 3. rule breaker

III. Equating knowledge of experiment for the subject

(Each prospective *S* comes with his conception of what the investigators intend to do and what is expected from him. While much of this material is covered in previous group meetings, it requires individual confirmation.)

- A. Reassurance
  - 1. Sequence of precautionary steps *E*s follow
  - 2. Safety of medications
  - 3. Confidentiality of data (and interview information)
- B. Co-responsibility of *S*s and *E*s
  - 1. Describe his role within total design
  - 2. Describe involvement and work *E*s put into study
  - 3. Joint respect for one another's conscientious efforts to make study valuable
- C. Instilling correct motivation and attitudes
  - 1. Follow up information from II C above, to correct if possible
  - 2. Discourage future self-dramatization
- D. Filling in any remaining gaps of knowledge

IV. Instigation of personal relations between the *S* and the *E*

(Obviously, an objective for entire interview)

- A. Interest in him as an individual
  - 1. In addition to interest in his background and personality, we have a particular interest in him as a person, with interests, likes, dislikes, needs and problems.
  - 2. There is no "right" or "wrong" response to a drug. Remove value judgments from drug effects.
- B. Establish avenues for exchange of later relevant information
  - 1. If *S* is convinced of our interest, he will be willing to furnish elaboration of a drug effect. Give him examples now of kind of information we will need and want.
  - 2. Examples of daily external events we need to be informed of as they occur, e.g., examinations or employment interview on experimental day.

V. By-product information and impressions become later aids in interpretation of anomalous results of individual subjects.

- A. Will *S* minimize or exaggerate
- B. Is *S* highly verbal and therefore will report easily and fully (rather than decide a drug reduces inhibition yielding this type of report)

C. How well-controlled is he likely to be? He may have a drug effect but exhibits excellent superficial control and appearance of normalcy. If one perceives controlled confidence in the interview, one can look for it later in drug response.

D. If *S* accurately relates many personal-environmental problems, but under emotional control, one can expect and understand similar response in handling unusual drug effect.

All interviewees are paid for the time spent.

6. *Selection of Subjects*

a. Size of group. The size of the *N* is determined by four considerations. (*a*) What phenomenon is to be investigated? Here we depend on our past experience. A physiological study of the effects of drugs on nystagmus would require only a small number of *S*s, perhaps five; well controlled studies of motion sickness require perhaps 24; adjective check list studies perhaps 30. (*b*) How good will *S*s drawn from this population be at reporting effects? Five experienced observers tested a new compound on themselves and all found headache the main noticeable symptom. We later were able to include this drug in a study with an *N* of 30 and confirmed the result. (*c*) What is the nature of the drug and its dose? The effect of some drugs is much more uniform than is true of others. We have found that dramamine gives consistent results: while *S*'s vary in the amount of effect, it is rare to find any variation in direction of effects on the ACL. As one reduces dose to near threshold the chance of a difference in direction increases. (*d*) How large an *N* can be used with proper controls? We have found that our present staff can handle 30-36 *S*s (two sessions per week over an eight-week period) and maintain fairly good personal relations, training and discipline. A larger *N* taxes the *E*s' memory for both the individual *S* and the design detail inherent in our research methods. *S*s are less cooperative if they perceive themselves as only one of a large group. If the results from a small *N* are questionable, it is better to repeat a small *N* design than to conduct a study using a large *N* simultaneously and sacrificing important control in training, personal relations, and discipline.

b. "Randomness" in selection. The second problem is whether selection should be random. It appears that many investigators interpret "random" to mean that one should let chance be the *only* determiner of selection. To this we would extend Hume's reaction when he quoted a reviewer, "The sentence—'The random selection of compounds to be tested should be adhered to as strictly as possible'—has a kind of lunatic flavour about it." Such empiricism may forego good experimentation in order to conform to the assumptions of a formula designed to show how good ones results are. In the process one may obtain poor results: unreliable, invalid, or both. We select our *S*s with great care, matching groups, and practice randomness of assignment only after satisfying our selection criteria. There is no known reason to assume that cooperative *S*s are other than random with respect to drug reactions. It is therefore only sensible to select those *S*s who are able and willing to cooperate.

Another selection criterion is body weight. Much unnecessary labor in drug preparation can be avoided by selecting only *S*s of medium weight (130-190 lbs. for males) and then giving all a standard dose. This also reduces certain ambiguities of interpretation by eliminating some extremes of body build.

One final consideration we have found to our advantage is to include campus "opinion makers" as *S*s. As a rule not only do these high prestige people make conscientious *S*s but they will also protect the project reputation, first by their willingness to participate and secondly by their favorable comments.

7. *Selection of Medications*

This section describes the criteria we applied in our "out-patient" studies which used four or more different drugs.

a. Physiological safety. College student *S*s should be given only completely safe drugs. When risk is involved it seems more appropriate to work on one-self or on patients who have something to gain from taking a risk.

Several scientists and physicians have expressed concern over possible idiosyncratic or allergic responses to drugs in our work. We have never seen such responses, in spite of using many drugs and many *S*s, and confess to ignorance of the reasons for our immunity. It may be that our screening eliminates such *S*s.

b. Psychological safety. A very pleasant reaction to a drug can generate a future addictive risk. We find it best to select those drugs whose effects, at a particular dose level, fall within the range of normal personality fluctuation of individuals. We try to include drugs having a range of effects from slightly positive to slightly negative. This reduces placebo effects.

c. We do not normally choose drugs whose onset effect obscures the "steady state" effects. *S*s may respond undiscriminatingly to the steady state because of disturbing onset effects, e.g., dizziness. They become frightened and anxious and perhaps do not calm down enough to discover and report accurately the unalarming aspects of the true steady state. (This also has implications for the timing of observations. We try to time our after-drug testing on the descending limb of the drug effect, at which time there is increased likelihood of accuracy in subjects' reports.)

d. We use drugs of roughly similar time to maximum action. (Some drugs, e.g., alcohol, dramamine, have changes in effects with course of time which will need to be taken into account.)

e. We select those drugs with which we are willing to get prior personal experience, for the following reasons: (*a*) Doing experiments on new drugs without testing them on one-self is tremendously wasteful. Many new drugs are inactive. (*b*) One cannot choose or create testing instruments unless one knows what areas of behavior are affected. A testing instrument must include relevant choices to assess the effect. (*c*) Know the possible range and variability of effect of the drug. (*d*) Determine for yourself its safety. (*e*) It allows one to arrive at the proper dose, the proper time to measure changes, etc.

8. *Sequence of Drug Administration*

In our recent experiments (where the *S*s were divided into three groups based on anxiety level, where a number of drugs were used and where both milk sugar placebos and a standard dose of dramamine were used as control measures) we used a non-random sequence of drug administration as shown below (Table 1).

The letters are the first letters of the drug name (Placebo, Aspirin, Phenacetin, Caffein, Dramamine, Nilevar, Benzedrine, Miltown). The same table was used for each of the three groups of *S*s of different anxiety levels. The table was constructed by a "cut and try" method and could probably be improved by further effort. Inspection of the table shows the following objectives (some not perfectly realized):

a. Two initial placebo sessions are included because experience has shown that the placebo effect does not wear off until the third session. This also gives time for training.

b. Each drug appears an equal number of times on each day.

c. The control doses (placebo and dramamine) appear for each *S* in both first and second half of his sessions.

d. Drugs with similar effects (dramamine and meprobamate, benzedrine and caffein) do not appear on consecutive sessions.

e. Extended sequences of doses having little detectable effect or sequences with very noticeable effects were avoided.

TABLE 1

EXPERIMENTAL SESSION NUMBER

Subj. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Pl	Pl	D	Pl	M	Ph	A	C	D	N	AP	Pl	APC	B	MB	
2	Pl	Pl	AP	D	Ph	Pl	C	M	N	D	B	APC	MB	Pl	A	
3	Pl	Pl	MB	Ph	D	C	Pl	B	M	Pl	D	A	N	AP	APC	
4	Pl	Pl	C	M	A	D	N	Pl	Ph	B	APC	D	Pl	MB	AP	
5	Pl	Pl	M	MB	C	Pl	D	APC	A	Ph	Pl	AP	D	N	B	
6	Pl	Pl	B	C	Pl	A	AP	D	APC	M	N	Ph	Pl	D	MB	
7	Pl	Pl	APC	A	B	AP	Pl	MB	D	N	Ph	M	C	Pl	D	
8	Pl	Pl	Pl	APC	AP	M	B	D	Pl	C	MB	N	Ph	A	D	B*
9	Pl	Pl	N	B	APC	MB	D	Ph	Pl	AP	M	C	A	D	Pl	MB*
10	Pl	Pl	Ph	AP	N	D	APC	Pl	C	MB	A	B	D	M	Pl	
11	Pl	Pl	N	Pl	D	B	MB	A	AP	Pl	C	D	M	APC	Ph	
12	Pl	Pl	Pl	D	MB	APC	Ph	N	B	A	D	Pl	AP	C	M	

* See explanation in text (Paragraph *g*, p. 196).

f. It needs to be commented that arbitrary rules inherent in Latin square designs receive no consideration. Such rules overlook the fact that the drug sequence of *each* *S* should produce the least possible change in his expectancies.

g. Do not end an *S*'s sequence with a drug which the *S* regards as having a negative effect. When the normal sequence does end in this way, run that *S* for another session (whose data will not be used).

9. *Drug Preparation*

Unless one is lucky in having a supplier, both willing and accurate, who will pack the quantity of capsules required, it is safest to arrange to have it done by research personnel. (Our most recent study required about 1700 capsules.) Your pharmacist will gladly spend a day training someone—rather than accept a requisition to do them himself!

The first step is to decide what size capsule to use, and this should not be determined by the dose size or bulk of the medications. The deciding factor is what size capsule, as a function of how many, are *S*s happy about swallowing. We have found three No. 2 capsules, as a single administration, acceptable to our *S*s and adequate to accomodate our particular medications. The fact that we give three capsules each time is determined by the largest undiluted bulk of our various drugs. Any drug dose plus dilution which fits into one or two capsules is accompanied by two or one milk sugar capsules to yield a standard administration of three white capsules.

It is essential that two people work together, checking and rechecking one another, on every phase of preparing the drugs, packing capsules, labeling and filling subject envelopes. The last operation is checked against the drug sequence chart. This is the operation most susceptible to mistakes and must be done with greatest care. All drugs are actually put in envelopes before the experiment begins, and labelled with the *S*'s own name and session number.

The ramifications of a mistake in drug preparation are so obvious as to need little amplification. Irreparable damage to *S*'s confidence is certain to result from any error. Imagine an *S*'s reaction as he is about to take his medication if an investigator were to intercede explaining, no matter how calmly, that a mistake had been made, not to swallow those capsules. Checking and rechecking, well in advance, cannot be overemphasized. The investigator needs absolute certainty as to the drug dose accuracy before seeing any *S*s. Only then can he adequately handle the infrequent (but entirely possible) situation of an *S*, ill from other reasons, anxiously asking, "Are you sure you gave me the right drug; I feel peculiar?"

The second source of error, that of putting the right drugs into the wrong session envelopes, damages the carefully constructed drug design. Data analyses depend on each subject having each drug in a specified sequence. Attempting to correct such an error by running the *S* an extra day does not entirely erradicate the effect of the misplaced drug, to say nothing of the effect on the *S*'s confidence.

10. *Modified "Double-Blind" Procedures*

In contemporary drug research no one appears to dare to violate the sanctity of the "double-blind" method. We do not wholly share this attitude.

We do not believe that we can guarantee our *S*s the maximum safety by adopting double-blind procedures. A pharmacological idiosyncratic reaction may not be detected by the double-blind observer. An observer of drug subjects had better have at least one eye open. We accomplish this maneuver by having the drug sequence chart always available and referring to it after reviewing each *completed* post-drug report before releasing the *S*. The sanctity of the uninfluenced subjective report is preserved and the *S* and observer have mutual confidence that there is no unusual effect. An incidental advantage in this procedure is that the *S*, knowing that such a check will be made, attempts a more accurate and thoughtful report.

Another reason against double-blind procedures, and some may think this should come first, is that skilled observers do not stay blind. While they may not discriminate between related drugs, e.g., amphetamine *vs* caffein, they perceive the effects as one or the other and not placebo. They rarely miss or confuse with other drugs the definite configuration of dramamine effects. It would be ridiculous to argue that investigators of drug research should be other than sensitive in perceiving and discriminating drug responses. This obvious requirement is discussed below in describing day-to-day handling of *S*s.

Even though our experience makes us observers who are no longer blind, this has no visible biasing effect on our *S*s. In fact they often express themselves as being frustrated by their inability to gain any information from our voice or manner.

F. THE SO-CALLED PLACEBO EFFECT

1. *Control or Minimization of the Placebo Effect*

Our experience has been that the placebo effect can be eliminated by correct handling of *S*s (and by a little good luck). The bad luck enters when individuals not under your control influence the *S*'s attitudes. For example, when we were half way through our last experiment some campus wag started the rumor that we were giving "hate pills." In spite of our efforts to clear this up in the minds of our *S*s, there was a very slight shift to negative emotions in the placebo sessions of the last half of the experiment.

Reference to what has already been said in this paper will show that at every step (initial letter of invitation, initial group session, interview, experimental session itself, and sequence of drug administration) our efforts are directed at reducing placebo effect without at the same time sacrificing sensitivity of observation. These procedures take "drug experiment" out of the realm of the mysterious, exciting, opium-den setting, and place it in the truthful and reasonable setting of scientific investigation of a wide-spread, on-going phenomenon: intelligent people should study something so relevant as the wide-spread use of aspirin and caffein in the amounts in which they are consumed. The college students learn that we are not involved with exposing them to addicting substances, we are not going to "slug" them with over-doses—in fact, we tell them that most of the time our subjects will be unable to determine the presence or absence of effects.

These combined factors of information and attitude arouse their critical sense and provoke healthy introspective attitudes.

2. *Nature of the Placebo Effect and of Related Phenomena*

We do not like the term "placebo effect." This term implies that the cause of the effect is the white capsules. The actual causes are much more complex. They include the attitude of the *S* toward the *E*, the *S*'s perception of the *E*, the *S*'s expectations as affected by the total procedures and his environment both in and out of the laboratory, and the kinds of drugs being used.

Placebo effects, broadly defined, can be of at least two kinds, the first of which is found to a pronounced degree only during the first two days in our experiments. For most *S*s these effects occur in their first *pre-drug* reports. They consist of apprehension, inattentiveness, lassitude, etc. Since the milk sugar fails to confirm their fears, the post-drug reports show *decreases* in such feelings. On the other hand, a few *S*s may go sharply toward symptom development in the post-drug reports. The extent to which this happens will differ from one experiment to another depending on the attitudinal sets which have been generated. When such symptoms or others of a self-suggestion nature are severe, the *S* should be reassured by getting out the drug schedule and reporting to him in a matter-of-fact way that he had milk sugar. Then, to save his self-esteem, suggest that he may have an illness and that, if the symptoms do not clear up soon, he should report to the college physician. (They do not go, because the symptoms clear up.) One should expect that about 10 per cent of college student *S*s will have fairly marked placebo effects on the first or second day.

A second possible placebo effect may be inferred to be present, even though its presence is not subject to direct proof during any single experiment. This is an imperceptiveness of drug effects based on over-selling the *S*s on the attitude that the doses are very small and perhaps undetectable. Such *S*s may not make the necessary introspective effort to report conscientiously. We believe that the use of the forced choice short ACL (see p. 207) helps in overcoming this. It is also helped by telling an *S* that the adjectives he has checked do in fact correspond to the changes expected from the drug in question, even though he may not be aware of any effect. Since this is usually true, no deception is involved. In the very rare cases in which it is not true, a report to the subject that he does not report the expected effect will cause him on future session to make a greater effort. Such conversations do not bias future performance because (*a*) the *S* knows he will be on different medications and (*b*) no reference is made to specific adjectives.

Another common phenomenon of distorted data takes place when a drug is given which has effects disturbing to the *S*. There are derived or secondary changes in the *S* which are not directly due to the drug, but due to the *S*'s emotional reaction or other conditioned reactions to the primary effects of the drug. For example, if a *S* has been given a tranquilizer and becomes over-sedated on a day when he must do important work, he may show anger and resentment toward the investigators, and these emotions will be reported in the ACL. (We may then handle the over-sedation by giving amphetamine as an antidote before the *S* leaves the laboratory. We also remind him that we invited information in his earlier visit that day as to whether he had pressing obligations to fulfill and would he please help us and himself by taking the question seriously in the future.) Anxiety is another common derived reaction to some primary and direct drug effect. Some *S*s show a derived euphoria and excitement when they like the way a drug has made them feel. Drugs which cause dizziness may, in some *S*s, set off a conditioned reaction of nausea, not itself a drug effect.

These derived effects undoubtedly show up in the published data of many studies. There is no way they can be identified other than by perceptive observers. Since they are wholly a product of the experimental setting (and would in few instances apply to use of the same drug with patients) the investigators are under an obligation to report their opinion as to whether certain effects are primary or derived.

Changes may take place after administration of placebo which are true changes but are not placebo effects. We give our drugs before lunch and compare measures taken at that time with measures taken after lunch. It could be expected that there would be physiological and psychological changes between these two times. The amount of this effect for an individual is probably interrelated with factors such as weather, size of lunch, etc.

Placebo effects are present under the following conditions:

a. Untrained *S*s, e.g., we have found that in all of our experiments the data of the first two experimental days show placebo effects and should not be used.

b. *S*s who are unwilling, e.g., in one of the experiments in a laboratory related to ours the *S*s were ordered to serve. Placebo effects were strong.

c. Untrained experimenters, e.g., a detectable lack of certainty and confidence or lack of personal interest will produce reports of anxiety and hostility.

d. Poor selection of drugs, e.g., alarming onset symptoms may distort the true effect of the drug.

e. Bad drug sequence, e.g., consecutive days of drugs having similar effects will generate expectations of more of the same.

G. Description of Experimental Sessions

1. *Introductory Comments*

The methods used in conducting the experimental sessions have certain goals: (*a*) to retain and enhance the respect, liking, and cooperation of the *S*s for the *E*s; (*b*) to make the *S*s feel secure about the safety of the experiment; (*c*) to achieve tight discipline on all matters that are vital to the success of the experiment; (*d*) to operate in such a manner that no accidents will occur; (*e*) to keep each *S*'s attitudes and expectancies of what drug effects he may anticipate as nearly constant and standardized as possible from day-to-day.

The amount of time devoted to achieving these goals, and the methods used, will vary for different *S*s, different *E*s and different *S-E* relationships. (We generally have three *E*s present when *S*s arrive on a tight schedule. When only a few *S*s are scheduled we can reduce this to two or even one.) The amount of time will also vary with the stage of the experiment, e.g., the first two days are training days (although not so identified for the *S*s), the tightness of the day's schedule, and the kinds of situations which arise. Being rigid about the amount of time spent is obviously wrong; flexibility puts the *S*s at ease.

In order to achieve constancy in attitudes and expectancies one needs to be adaptable to the situation. It is not merely that one needs to treat 36 *S*s in 36 different ways to achieve the same result; the situation is even more complicated because 3 *E*s are involved and the *S*s come with different needs on different days. Some *S*s need reassurance; others are actually frightened by it. Some are insecure or in doubt whether they have reported correctly; these require encouragement and approval. Some need to be encouraged to report more; others need to be questioned about what may appear to be indiscriminate checking of adjectives on the ACL. Such conversations are common in the two initial training sessions but are rare thereafter and, if they occur, then only *after* filing of the post-drug reports.

Handling of unusual or strong effects is perhaps the most critical place for errors of judgment. Here a good insight into the individual subject is essential. Our procedures are affected by the fact that there are usually other *S*s in the room when the situation arises so that their attitudes and expectancies will also be influenced. We believe this to be an advantage, for our handling of the problem is reassuring to all of them and reduces apprehension about coming sessions. (When harm would be done to other *S*s, one of us unobtrusively follows the affected *S* from the room and talks to him in privacy.) Some *S*s exaggerate symptoms and ask for help in relieving them; some minimize them; others say nothing at all, perhaps out of embarrassment, shyness, or a belief that the symptoms are a normal part of the work. In any case one must adopt the appropriate manner of reply and make the right decision about what to do so that any *S* present will come for his next sessions with his attitudes undisturbed. We occasionally relieve over-sedation by an amphetamine or over-stimulation by a tranquilizer.

The *E*'s part in meeting over-reaction to drug begins by never showing alarm. Over-reaction is usually obvious when the *S* first enters the room. He is asked to complete his reports. Then the *E* should look up the medication sequence. Calm questioning and interest without anxiety are needed.

Often the situation resolves itself easily when information is given, e.g., "You will find that your response is already getting less. By four o'clock it will be down to about half the peak. By 6 or 7 o'clock the effects will be over. We can relieve your symptoms by another medication, if you wish. This will take about 45 minutes to begin to be effective." Most *S*s then decline the counter-medication. Occasionally, when a *S* has an important engagement, the *E* must urge him to take it.

2. *Day-to-Day Treatment of Subjects*

The first two days of our recent experiments have been placebo days used for training. Since the *S*s do not know this, their eagerness to learn introspection is not reduced. And since the data are not used to establish base lines, the *E*s can give help and make suggestions. Contrary to common belief a good *E* can make many correct inferences about emotional and motivational states based in a few minutes of observation. These are used to help the *S* correct omissions in his ACL. By the third day, when the true testing begins the *E* is no longer allowed to make corrections of this kind, but by that time the *S* is likely to be a careful introspector because he knows that the *E* is perceptive and will check his reports.

It is essential that at least one of the *E*s knows every subject well on the first day he arrives for a laboratory session. By necessity the person who conducted the selection interviews is also cast in the role of being first to meet each *S*. Through him the other *E*s can be coached to get to know each *S*'s own name, code name, and personality and background. Thus all can contribute to the *S*'s perception that he is met as himself, rather than as an experimental guinea pig without individuality. (It should be commented that this also makes the work much pleasanter for the investigators and prevents boredom on their part.)

Another necessary attribute of the behavior of the *E*s is that they always act as though they know what they are doing. Apparent indecisiveness alarms any *S*; he must be able to have complete confidence that he is in safe hands. This requires that *E*s be screened for personality and that they really do know what they should be doing. (See below for discussion of attributes of a good *E*.)

3. *Sequence of Events During a Typical Day's Session*

Let us assume that an *S* arrives at 11:30. There are four other *S*s present, each working on filling out forms or chatting with one of the *E*s. The description below gives an over-view of what happens and the approximate timing of it.

(Prior to the beginning of the day's sessions *E* has pre-labeled each of the report forms with the code name of the S, has verified the progress of each *S* in his drug sequence, has before him a progress chart showing all completed days, and has the envelopes which contain the medication for each *S* due that day.)

11:30 *S* arrives and is greeted by *E* (or *E*s) by his first name; pleasantries are exchanged. *E* verifies (aloud) the time when *S* was due and then glances at clock; he shows suitable restrained satisfaction (or dissatisfaction). *E* checks progress from progress chart and verifies this with *S*. At this time *S*s are sometimes excused because conversation shows illness or conflicting activities.

E gives forms to *S* (Exhibits A and B, Tables 2-3) shows him to a seat where he will interact least with other *S*s.

11:31-11:40 *S* first fills out Exhibit A form, then the long ACL (Exhibit B). The *E* makes no attempt to draw the *S* into conversation while he is completing forms.

11:40 *S* gives both forms to an *E* who reads through the entire forms for omissions, etc. For most *S*s it is desirable for the *E* to initiate conversation, especially about the first form. Not only does it prove interest on the part of the *E*, but also may bring to light reason to excuse the *S* without medication for the day because of illness, infraction of rules, or because a prospective mid-afternoon task would be impaired by a drug. If the *S* is not excused he is given a sealed envelope containing three capsules, labeled with the *S*s own name and the session number. *The S is required to read the label to verify that it is the correct name and session number* because *E*s can easily pick up a wrong envelope. The *S* swallows the capsules along with 5-6 oz. of water; the *E* observes this (*S*s have been known to pocket drug doses).

11:41 As *S* takes the drug dose *E* calls attention to the time and tells the *S* he is to be back at 1:41, i.e., two hours later, and gives him a written note of the time for return.

After this *S* may depart or may stay for sociable conversation if one or more *E*s are free.

1:41 *S* returns. If he is early (before 1:41) he may be asked to wait; if he is very late he may be excused and the day's session repeated (this rarely happens and then because *S*s forget they have had a drug!). (The non-appearance of an *S* is sometimes a source of anxiety to the *E*s and is good reason to check whether he is on placebo or drug.)

E gives *S* three forms: Exhibit C, Table 4, the long ACL (Exhibit B, Table 3), and a forced choice ACL (Exhibit D, Table 5); he is shown to a seat.

1:42-1:52 *S* fills out forms in the order, C, B, D.

1:52 *S* gives forms to *E* who first checks drug sequence schedule to see what the medication has been and then reads through all forms to find omissions and to get an impression of whether the expected response is present. (In one recent instance where it was opposite to the expected response it was found that the *S* had two bottles of beer with lunch and had withheld this information. He was required to repeat the session.) This process of verification is an important factor in keeping *S*s working conscientiously and for our approval. The *E* should rather frequently comment that the *S*'s report is good. This is especially useful for the morale of *S*s who are not aware of a drug effect. (See comment about this, p. 199.)

At this time *E* may decide that the *S* has an over-reaction and take corrective steps (see above).

TABLE 2
EXHIBIT A

Name______________________________ Date______________

Time______________

1. How much sleep did you have last night?__________hours
2. Are you in good health today? Yes______No______?______
   If your answer is other than yes, please describe what is wrong and how bad it is.______________________________
   ____
3. Have you taken any medication or alcohol since four o'clock yesterday afternoon?
   Yes______No______
   If your answer is yes, please tell what you took, when, and how much
   ____
4. Has anything happened today which will affect today's list in any way, for better or worse? Yes______No______
   If your answer is yes, what was it and how has is made you feel?______________
   ____

Since the adjective check lists will be our only data, please do them with the utmost conscientiousness.

TABLE 3

EXHIBIT B: ADJECTIVE CHECK LIST

Name________________________________ Date______________

Check each of the adjectives which you feel is descriptive of your feeling, state or mood at this moment. Use a double check (√√) to the left of the number if the adjective definitely applies, a single (√) if it slightly or possibly applies, leave it blank if it seems not to apply or if you can't decide.

1. active
2. aggressive
3. ambitious
4. amused
5. angry
6. annoyed
7. antagonistic
8. anxious
9. apprehensive
10. ashamed
11. assertive
12. attentive
13. belligerent
14. blue
15. boastful
16. bored
17. brooding
18. business-like
19. carefree
20. careful
21. cautious
22. changeable
23. cheerful
24. close-mouthed
25. confident
26. confused
27. cooperative
28. decisive
29. defiant
30. depressed
31. detached
32. disinterested
33. dissatisfied
34. disturbed
35. dizzy
36. dominating
37. doubtful
38. downhearted
39. dreamy
40. drifting
41. drowsy
42. dubious
43. dull
44. eager
45. easygoing
46. effective
47. efficient
48. egotistic
49. elated
50. emotional
51. energetic
52. engrossed
53. enterprising
54. enthusiastic
55. excited
56. fearless
57. forceful
58. friendly
59. generous
60. genial
61. goodnatured
62. guilty
63. happy
64. hardworking
65. headache
66. hostile
67. humorous
68. impatient
69. impulsive
70. indifferent
71. industrious
72. intoxicated
73. jittery
74. joyous
75. keyed-up
76. kindly
77. lackadaisical
78. languid
79. lazy
80. leisurely
81. light-headed
82. masterful
83. meticulous
84. mischievous
85. nervous
86. nonchalant
87. obliging
88. optimistic
89. original
90. patient
91. peaceful
92. quiet
93. rebellious
94. reckless
95. relaxed
96. remorseful
97. resourceful
98. sad
99. sarcastic
100. satisfied
101. self-confident
102. self-conscious
103. self-contained
104. sexy
105. shy
106. silent
107. skeptical
108. sleepy
109. sluggish
110. sociable
111. subdued
112. suspicious
113. talkative
114. tame
115. task-involved
116. timid
117. tired
118. trustful
119. unhappy
120. uninhibited
121. upset
122. vigorous
123. warm-hearted
124. washed-out
125. weak
126. weary
127. willful
128. withdrawn
129. witty
130. work-oriented

TABLE 4

EXHIBIT C

Name____________________________________ Date____________

Time____________

1. Please list below, in chronological order showing times, what you have done since you took the medication today.

Time____________ ____________________________

____________ ____________________________

____________ ____________________________

____________ ____________________________

2. Have you taken other medication (or alcohol) since you took ours?

Yes__________

No __________

If your answer is yes, what, when, and how much?

____

Please lay off cokes and coffee between lists.

3. Has anything you did since taking our medication affected you so as to change your adjective check list for better or worse?

Yes__________ No__________

If your answer is yes, what was it and how has it made you feel?__________

Before the *S* leaves, a date and time for the next sessions is agreed on. *S* is given a written note as a reminder.

The *S* may remain for conversation or may leave. Many of them elect to stay for a time.

4. *Rules Imposed on Subjects*

The *S*s are told about the rules at the initial meeting, during the selection interview and again at the first session when they receive them in writing (Exhibit E, Table 6). This in not enough for many *S*s. They will need to be reminded several more times of aspects of the rules. Copies of the rules should be left on the *S*s' work tables at all times.

H. COMMENTS ON ACLs AND OTHER FORMS

In a later paper we hope to report on the ACLs (Exhibits B and D) in some detail. For the present only a few comments will be made without going into the history of these ACLs.

The ACL has the advantage of being almost indefinitely repeatable and quick to administer. On the whole it appears to have good validity in that

TABLE 5

EXHIBIT D

Name____________________ Date____________________

This list gives you a chance to compare how you feel now with how you felt two hours ago. Please go through the list and show whether you felt more that way before the drug took effect or feel more that way now.

ANSWER EVERY ITEM

1. active — energetic	before	now	17. genial — friendly	before	now
2. angry — annoyed	before	now	18. gloomy — blue	before	now
3. anxious — fearful	before	now	19. grouchy — irritable	before	now
4. bored — uninterested	before	now	20. guilty — remorseful	before	now
5. careful — meticulous	before	now	21. humorous — witty	before	now
6. cheerful — happy	before	now	22. impatient — snappish	before	now
7. decisive — capable	before	now	23. industrious — work-oriented	before	now
8. defiant — belligerent	before	now	24. intoxicated — lightheaded	before	now
9. confused — disorganized	before	now	25. jittery — nervous	before	now
10. disturbed — upset	before	now	26. pain — discomfort	before	now
11. downhearted — sad	before	now	27. quiet — peaceful	before	now
12. drowsy — sleepy	before	now	28. resentful — indignant	before	now
13. dull — sluggish	before	now	29. self-confident — courageous	before	now
14. easygoing — relaxed	before	now	30. self-conscious — timid	before	now
15. egotistic — boastful	before	now	31. talkative — chatty	before	now
16. effective — efficient	before	now	32. tired — washed-out	before	now
			33. weak — lacking strength	before	now

Which way of feeling did you like better? before now

Do you believe that you felt any drug effects today? None_____Slight_____Moderate_____Definite_____

---

the drug-induced changes in the ACL correspond to observers' judgment and to objective performance by the *S*s. The evidence for this statement is not presented at this time.

TABLE 6

EXHIBIT E

March 26, 1959

Conditions of medication experiment — Spring, 1959

1. No medicine, drugs or alcohol for twelve hours before coming to the Laboratory. This includes aspirin and APC's, but not vitamins.

2. Coffee, tea, cocoa or cola drinks at breakfast *only if they are customary for you.* If you take one of these beverages, you must do so on *each day* you work with us and take the same amount each time.

3. No coffee, tea, cocoa or cola drinks from two hours before coming to the Laboratory until after you leave for the second time. Specifically, none at lunch.

4. Smoking is permitted in your *usual* amount only.

5. We strongly prefer that you eat breakfast and that this be at least two hours before coming to the Laboratory.

6. We require that you eat lunch (minimum the equivalent of one sandwich) between your first and second trip to the Laboratory.

7. Automobile driving is not allowed (except by special permission) for 2¼ hours after taking medication.

8. If, at any time you have questions or worries about any aspect of your reaction, please call Jean Cameron or Dr. Wendt, or stop in to see them (Tel. GR 3-3000, Ext. 281 or BR 1-1837).

JEAN S. CAMERON
PRISCILLA G. SPECHT
G. R. WENDT

Please keep this memo.

The long ACL (130 adjectives) is the residual of many more adjectives which have been tried in the drug experiments done by us and earlier collaborators. In general, the adjectives which were retained for this list were those which showed changes after drugs; those eliminated showed small or no changes. The list is capable of improvement, e.g., the word *"anxious"* is interpreted by about half the *S*s to mean "eager," the word *"disinterested"* means "lacking eagerness" to many, and the words, *"timid," "shy,"* and *"guilty"* are not often checked by male college students. Other investigators should feel free to add or delete words as the characteristics of the subject population or the nature of the expected drug effects require.

In data analysis we assign the arbitrary numbers 1, 2, or 3 to adjectives not checked, those with single checks, and those with double checks, respectively. The drug effect for any adjective is then the total amount of change algebraically summed, for a group of *S*s, from their pre-drug lists to their post-drug lists.

We also have used a variety of "cluster scores," selecting adjective clusters on various empirical or rational grounds. It can be done by similarity of dictionary meaning, by having a group of *S*s sort them into categories for similarity, or by statistical methods of actual correlation. We have also used drug clusters, e.g., the "dramamine cluster" consists of all those adjectives which regularly change after dramamine. Each method can be defended and has its own virtues and defects.

The short ACL is a quite different instrument. There are no "change scores" since it is given only at the post-drug report period. The *S* must decide for each of 33 pairs of adjectives whether they were more true of him before taking the drug or at the post-drug report time. This procedure is both more sensitive and less discriminating than the long ACL. In the long ACL *S*s tend to react to each adjective as an independent entity. With a forced choice there is more of a tendency to generalize from one feeling state to a similar one.

The short ACL contains two other items: a rating scale of the amount of drug effect felt and a choice of whether the *S* likes his state better before or after drug. These give the *E*s an easy check on each *S* at the end of his post-drug report period.

The data of the short ACL consist of the number of *S*s circling "before" *vs* "now" for each adjective pair. These few data can easily be tabulated and kept up to date. If anything is going wrong in an experiment it can be detected. Drug research is too costly to complete an expensive design likely to yield meaningless results.

We use a number of other forms and form letters in addition to those reproduced here: a form showing the subjects' free hours, telephone and mail address, a form for personal and biographical data used to aid in picking *S*s for the selection interviews, a form letter notifying those accepted as *S*s and setting a time for first appointment, a form letter for the rejected candidates, and occasionally forms for special purposes.

I. SELECTION OF CO-INVESTIGATORS

We have been involved in drug experiments which yielded useless data and others which yielded good data. One of the crucial variables determining the goodness of the data is the personality and skills of the investigators. It is also a major factor in safety of the work.

We believe that a combination of male and female investigators is best. In our last four "out-patient" experiments we have had MF, MFF, MFM, and MFF. If women *S*s are to be used, it seems mandatory that one of the

*E*s be a woman. The male has the advantage that he will be more effective in enforcing discipline, if only by his presence. The female has had the advantages (in our experience) that more of them were highly perceptive about *S*s and that more of them were willing to tolerate a mass of detail. *S*s also expect them to be more compassionate.

We feel that many investigators who do not qualify for drug research may be over-permissive, imperceptive, have poor judgment, lack personal warmth or an interest in people.

An acceptable team of investigators needs to have represented:

1. Intelligence.
2. Emotional control and the ability to keep a "poker face" when needed.
3. Real interest in the work, so that *S*s will become interested by contagion.
4. A high degree of perceptiveness about people.
5. Memory: (*a*) for people and personal items about them, (*b*) for detail put in the context of the whole experiment, (*c*) with an understanding of his limitations so that he depends on written reminders where memory may fail.
6. Personal warmth and social attractiveness.
7. Adaptability to any person irrespective of his personality.
8. The ability to think clearly in emergencies and to come up with the right solution.
9. A personality that elicits confidence in him and security about his knowledge and judgment.
10. Patience, tact, and firmness.

J. SUMMARY

We have described in some detail procedures developed over a period of years for use of college students as drug subjects. These procedures have yielded sensitive measures of drug-induced changes in mood, emotion, and motivation, and have avoided legal and public relations problems.

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VARIATIONS IN RETINAL QUANTUM ABSORPTIONS OF THE FOVEA AS A FUNCTION OF WAVELENGTH AND AREA*

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A. INTRODUCTION

Recent research in the field of Physics on the nature and measurement of light centers attention more and more upon the quantum hypothesis. Essentially, this hypothesis consists in the concept of light as a series of discrete 'bullet-like' units of energy known as quanta. Interest in the quantum as the basic unit with regard to light has naturally spread into the field of visual Psychology.

The basic modern works relating quanta and visual thresholds have been done by Hecht, Schlaer, and Pirenne (12) in America, and by van der Velden and Bouman (2, 3) in Europe. Hecht, Schlaer, and Pirenne, using the method of constant stimuli, sought to establish the absolute scotopic threshold (i.e., rod threshold at 510 mμ) in quanta. Both by correcting their data for ocular absorptions and by matching the curves to the statistically established curves of the Poisson distribution, they estimated the quanta at threshold at the retina to lie between five and 14. Van der Velden and Bouman, in a series of articles, present data which, when subject to Poisson analysis, yield an estimate of two quanta within a given area and duration as requisite for threshold stimulation.

More recently Zegers (30), employing the method of constant stimuli and a refinement of Hecht's calculational procedure applied to foveal data, presented estimates of the number of quanta required for threshod in relation to both cones and bipolar cells for four wavelengths and three field sizes. The ratio yielded by this study is one quantum per 10-16 cones, or one

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[1] This study was submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology in Fordham University. The author wishes to express her sincere gratitude to Dr. Anne Anastasi for her statistical guidance and to Dr. William E. Collins for his technical assistance; to Professors Joseph G. Keegan, S.J. and Henryk Misiak, for their critical reading of the manuscript; and to Professor Richard T. Zegers, S.J. for his continued and careful guidance as mentor of this dissertation. Dr. LaDriere is now teaching at Marymount College, Tarrytown, New York.

quantum to every *e* or *f* bipolar. An adumbration of Zegers' interpretation had appeared in the work of Dillon and Zegers (4). These authors presented quantal estimates of the foveal luminosity function for a 1° field, and anchor this curve by providing the quanta per cone ratio for wavelength 550 mμ.

The present experiment was planned as a direct extension of these two studies in that it examined the foveal luminosity function using various field sizes and expressed the data in quanta per cone ratios. It was also hoped that this research might clarify two other topics of interest: namely, (*a*) the failure in area-intensity studies to arrive at a single equation describing the function, and also, (*b*) the question of the existence and causes of the reported foveal tritanopia with small fields.

With regard to the area-intensity studies, only the general formulation that an inverse relationship exists between these two parameters is possible from existing data. This relationship is not linear and directly proportional, but tends rather to be negatively accelerated and asymptotic as area is increased, ultimately reaching the point where, with the largest areas, threshold intensity becomes independent of area. Due to this complexity of function, it has been impossible to specify this relationship in terms of any single function. Earlier attempts are represented in Ricco's law and Piper's equation, both of which are accurate only in very restricted areas, i.e., small foveal or peripheral fields under 10 minutes of arc, and peripheral fields of between 2 and 7 degrees of arc, respectively.

Outstanding among more recent attempts to clarify this relationship is the work of Baumgardt (1) who bases his formulations both on Ricco's and Piper's laws and upon the quantal approach itself. This investigator argues that the area-intensity function is essentially two-fold and demonstrates empirically his predictions that Ricco's law applies only when the stimulus area is restricted to the size of a single 'quasi-independent unit'; while for larger stimulus areas, where two or more such units are combined and function together, Piper's law best describes the function. Piper's law is, then, considered valid everywhere where the retinal population is both homogeneous and includes more than a single 'quasi-independent unit.' In the fovea, Baumgardt further holds, the nature of the 'quasi-independent unit' is the cone-to-bipolar-to-ganglion functional unit. Within the fovea, however, due to the gradual increase of cone diameter from center outward causing heterogeneity of population, Piper's law does not strictly apply, for the threshold intensity is observed to decrease more slowly than the square root of the stimulus area increases.

Willmer's (28) experimentation adds confirmation to Baumgardt's position. Testing with red and violet lights for foveal areas between 0.72′ and 19.4′, he found that, although results could be described as a continuous function, they fit more adequately into a curve of two discrete segments. The slope of the first is predicted by Ricco's law for smaller field sizes, and that of the second, by Piper's law for larger areas. Further, this investigator extends Baumgardt's work by noting that the critical area in which the change in inflection between the segments occurs is between five and six minutes of arc, approximating the size of the field of a single ganglion which is, therefore, assumed to be the definitive factor in the determination of the 'quasi-independent unit.'

Another topic immediately involved in any study of foveal sensitivity as related to area is that of the reported tritanopic-like effect of small field sizes upon the central fovea. Tritanopia refers to a loss of sensitivity in the blue region of the spectrum. The presence of similar loss when stimulation with small fields in the central fovea is carried out was first noticed by Konig (15). This proportionately greater loss in blue sensitivity than is to be expected as a simple function of decreasing field size, was termed foveal tritanopia, in the literature. Since the work of Konig, the question of the existence and causes of foveal tritanopia with small fields has been controversial. Sperling and Hsia (19), Wright (29), Thompson (21, 22, 23) and Stiles *et al.* (20), all obtained reduced sensitivity in the short wavelength end of the spectrum in foveal luminosity curves when testing with small fields. Willmer (26, 27) and Hartridge (9, 10, 11) report similar findings when using small test objects. Opposition to the postulated existence of this phenomenon has been offered by Parsons (15) and by Pirenne (20), who insist that it is merely an artifact of inadequate fixation. Among investigators who accept the existence of foveal tritanopia, further controversy exists regarding the causes of this phenomenon. Wald (24) suggests that it is due to differential absorption of the macular pigment. This position is implicitly opposed by Polyak (18) whose anatomical studies have shown that the macular pigmentation is thicker at the edges of the fovea and thinner in the central region, the very area in which foveal tritanopia has been observed. Willmer (25) holds that the blue loss in the fovea is due to the relative absence in this area of the blue receptor, which he postulates to be of rod, not cone, origin. This position is generally considered unconfirmed by anatomical studies. Further theorization about the retinal elements involved in this phenomenon has been fragmentary.

In summary, then, this study represented an attempt to investigate the foveal luminosity function in considerable detail and in a relatively new orientation, i.e., in quantal threshold estimates throughout the spectrum. For the sake of completeness, the fovea was explored with five centrally located fields of gradually increasing size. Areal effects were thus introduced and considered as well as the operationally defined phenomenon of foveal tritanopia which is apparently primarily related to field size.

B. Apparatus and Calibrations

This investigation made use of the Fordham four-beam Colorimeter, which consists basically of a power supply, four monochromators, an optical system, and calibrating equipment. A detailed discussion of this apparatus and methods of calibration is to be found in Zegers' monograph (30). Modifications of this apparatus for the present experimentation consisted essentially in: (*a*) arranging monochromator No. 1 so that it supplied monochromator No. 2 with its light energy, thus producing the purity of monochromatic light obtained in a double monochromator; (*b*) using a Graham variable speed transmission and accessory shutter arrangements to regulate the test flash duration; and (*c*) inserting a precision cut diaphragm in the main beam to control field size and location. Schematic presentation of the modified apparatus is to be found in Figure 1.

Calibrations for both wavelength and intensity were carried out before

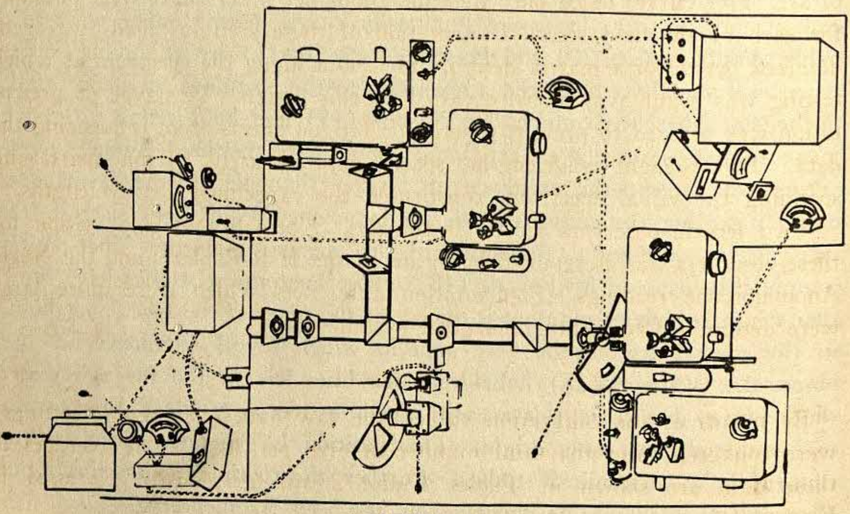

FIGURE 1

SCHEMATIC DIAGRAM OF THE APPARATUS AS USED IN THE PRESENT EXPERIMENT

(For detailed elaboration cf. the diagrams and discussion of the Fordham Colorimeter in Zegers, 1959, (30).)

any experimentation was done. Wedges and intensity controls were calibrated in position in the apparatus. Wavelength calibration consisted in relating graphically the line spectra of the various monochromatic filters, an AH 4 G.E. Mercury Arc light, and assorted Geissler tubes including hydrogen, argon, neon, and helium, to the drum settings of each monochromator. Intensity calibrations consisted in relating the responses of the two photomultiplier photometers, a Farrand and Photovolt, employing respectively a 1-P-22 and 1-P-21 photomultiplier tube, to the absolute units yielded by the output of a standard bulb calibrated by Electrical Testing Company in terms of flux density, i.e., microwatts per square centimeter. By means of the calibrated photomultiplier tubes, the intensity for every experimental wavelength was measured at the eyepiece of the apparatus before each experimental session.

C. Procedure

Essentially, the procedure of this investigation consisted in the obtaining of luminosity curves on each of two subjects for all of the five field sizes used in the experiment. The five stimulus fields were centrally located, concentric areas gradually increasing in size and so arranged as to extend from the tiny center of the fovea to its outermost boundary. From smallest to largest, they subtended visual angles of 5, 25, 50, 75, and 100 minutes of arc. Five curves based on 5 determinations per λ per curve were obtained for each of the field sizes. Presentation of these stimulus fields was randomized by use of a matrix design. The point along the spectrum at which testing was begun was likewise varied by this design. This type of presentation was utilized to prevent practise or fatigue effects from influencing the data. Twenty-eight wavelengths, spaced approximately 10 mμ apart, and spanning the visual spectrum, constituted the experimental wavelengths.

Two female observers served as subjects. Normality of color vision for these observers was ascertained by means of the H-R-R plates and the Nagel Anomaloscope readings. Pigmentation differences which were quite large were determined by ophthalmological examination.

D. Results

By means of the calibration values, the raw data (i.e., wedge settings) were converted into the total number of ergs per flash. The averages of these data are shown in Tables 1 and 2 and graphically expressed in Figure 2.

The ergs per flash were converted into quanta per cone values by the following steps: (*a*) The ergs per flash were divided by $h\nu$ to give the total number of quanta in the flash. (*b*) The areas presented by the diaphragms were corrected for diffraction according to the calculations made by Zegers (30) for the Fordham colorimeter. (*c*) The number of cones in these retinal areas was computed according to the data of Polyak (18). (*d*) Corrections for absorption by the ocular media and macular pigmentation were made according to the estimates presented by Ludveigh and McCarthy (14), and Wald (14), respectively. (*e*) Correction for the absorption of the photopigments themselves, according to the approximation given by Pirenne and Denton (17) was then applied to the data. The average quanta per cone values resultant upon these calculations are presented in Tables 3 and 4 and in Figure 3.

TABLE 1
AVERAGE THRESHOLD VALUES IN LOG ERGS FOR SUBJECT 1 FOR FIVE FIELD SIZES

			Field size		
λ(mμ)	5′ Field	25′ Field	50′ Field	75′ Field	100′ Field
430	—8.0765	—7.5661	—7.1894	—6.9715	—6.8210
440	—8.2357	—7.6979	—7.3166	—7.1356	—6.9449
450	—8.3502	—7.7684	—7.3722	—7.2888	—7.0917
460	—8.4667	—7.7968	—7.4710	—7.3904	—7.2245
470	—8.5746	—7.9867	—7.6227	—7.5052	—7.3837
480	—8.7305	—8.0900	—7.7178	—7.6009	—7.4476
490	—8.9442	—8.1658	—7.8252	—7.7032	—7.5558
500	—9.0446	—8.2890	—8.0239	—7.8619	—7.7352
510	—9.1679	—8.3817	—8.0993	—7.9444	—7.8257
520	—9.2742	—8.4646	—8.1887	—8.0254	—7.8777
530	—9.3056	—8.5101	—8.2764	—8.0451	—7.9025
540	—9.3302	—8.5347	—8.2962	—8.1014	—7.8897
550	—9.3496	—8.5450	—8.2994	—8.1136	—7.8761
560	—9.3724	—8.5527	—8.2777	—8.1086	—7.8646
570	—9.3358	—8.5044	—8.2331	—8.0554	—7.8117
580	—9.2553	—8.4787	—8.2089	—8.0297	—7.7686
590	—9.1955	—8.4239	—8.1218	—7.9699	—7.7374
600	—9.1431	—8.3162	—8.0287	—7.8692	—7.6515
610	—9.0072	—8.2642	—7.9614	—7.8115	—7.6081
620	—8.9312	—8.1772	—7.8816	—7.7323	—7.5067
630	—8.7661	—7.9984	—7.7411	—7.5737	—7.3632
640	—8.6012	—7.8607	—7.6444	—7.5139	—7.2345
650	—8.3654	—7.6364	—7.3539	—7.2871	—6.9965
661	—8.1138	—7.4424	—7.1297	—7.0217	—6.7777
673	—7.7776	—7.1830	—6.8198	—6.6824	—6.4022
685	—7.1428	—6.7900	—6.4214	—6.2621	—6.0345
697	—7.0848	—6.3391	—6.1098	—5.9018	—5.6093
709	—6.6197	—5.9971	—5.6806	—5.4726	—5.2939

An analysis of variance was performed on the data of each subject separately for all 28 wavelengths, five field sizes and five replications per cell. As shown in Tables 5 and 6, these analyses show, in both cases, that wavelength, field size, and interaction are significant at the .01 level of confidence.

If the data of the two subjects are combined, as seen in Table 7, then the analysis of variance yields wavelength, wavelength-subject interaction, field size-wavelength interaction, and triple interaction, all significant at the .01 level, while field size differences alone appear insignificant. However, according to the non-parametric sign test, all fields, except the 75 vs. 100 minute combination, are significantly different, one from another, at the .001 level, when all wavelengths are considered. When tested using only wavelengths from 430 to 530 mμ, all field sizes are significantly different at the .001 level. This suggests that the marked differences in sensitivity between subjects artificially conceals the effect of field size when the data of the two subjects are combined in a single analysis of variance. Further, analyses of variance done on the data of each subject separately for wavelengths 430 to 530 mμ support the tendency suggested by the sign tests, namely, that the effect of field size though apparent throughout, is most pronounced in the short wavelength end of the spectrum.

TABLE 2

AVERAGE THRESHOLD VALUES IN LOG ERGS FOR SUBJECT 2 FOR FIVE FIELD SIZES

			Field size		
λ(mμ)	5′ Field	25′ Field	50′ Field	75′ Field	100′ Field
430	—7.5189	—6.7978	—6.6368	—6.5159	—7.0474
440	—7.6537	—6.8930	—6.7338	—6.6436	—7.1150
450	—7.6922	—6.9708	—6.8059	—6.6941	—7.1780
460	—7.8541	—7.1128	—6.9172	—6.7399	—7.1760
470	—8.0329	—7.2811	—7.1206	—6.9469	—7.2067
480	—8.2712	—7.3781	—7.2113	—7.1488	—7.2962
490	—8.4616	—7.5713	—7.3875	—7.2755	—7.4941
500	—8.7574	—7.8366	—7.7288	—7.5818	—7.6256
510	—9.0262	—8.0950	—7.8890	—7.7337	—7.7510
520	—9.2531	—8.3224	—8.0597	—7.9776	—7.8635
530	—9.3548	—8.4175	—8.1539	—8.0935	—7.9346
540	—9.3759	—8.4589	—8.1700	—8.1479	—7.9788
550	—9.4313	—8.4800	—8.2245	—8.1873	—8.0270
560	—9.4397	—8.4851	—8.2291	—8.1891	—8.0185
570	—9.4090	—8.4518	—8.1946	—8.1567	—8.0041
580	—9.3713	—8.4278	—8.1855	—8.1083	—7.9228
590	—9.3199	—8.3971	—8.1182	—8.0585	—7.8992
600	—9.2469	—8.3263	—8.0220	—7.9754	—7.7620
610	—9.0996	—8.2044	—7.9184	—7.8532	—7.6921
620	—9.0502	—8.1162	—7.8243	—7.8254	—7.5756
630	—8.8988	—7.9728	—7.6965	—7.6863	—7.4552
640	—8.6686	—7.7683	—7.5336	—7.4569	—7.2288
650	—8.4357	—7.5594	—7.2762	—7.1833	—6.9963
661	—8.1485	—7.3825	—7.0495	—6.9921	—6.7593
673	—7.7871	—7.0222	—6.6859	—6.6906	—6.4309
685	—7.4866	—6.6760	—6.3553	—6.2356	—6.1075
697	—7.0916	—6.2440	—5.9245	—5.7587	—5.5799
709	—6.6829	—5.8639	—5.5772	—5.4440	—5.2254

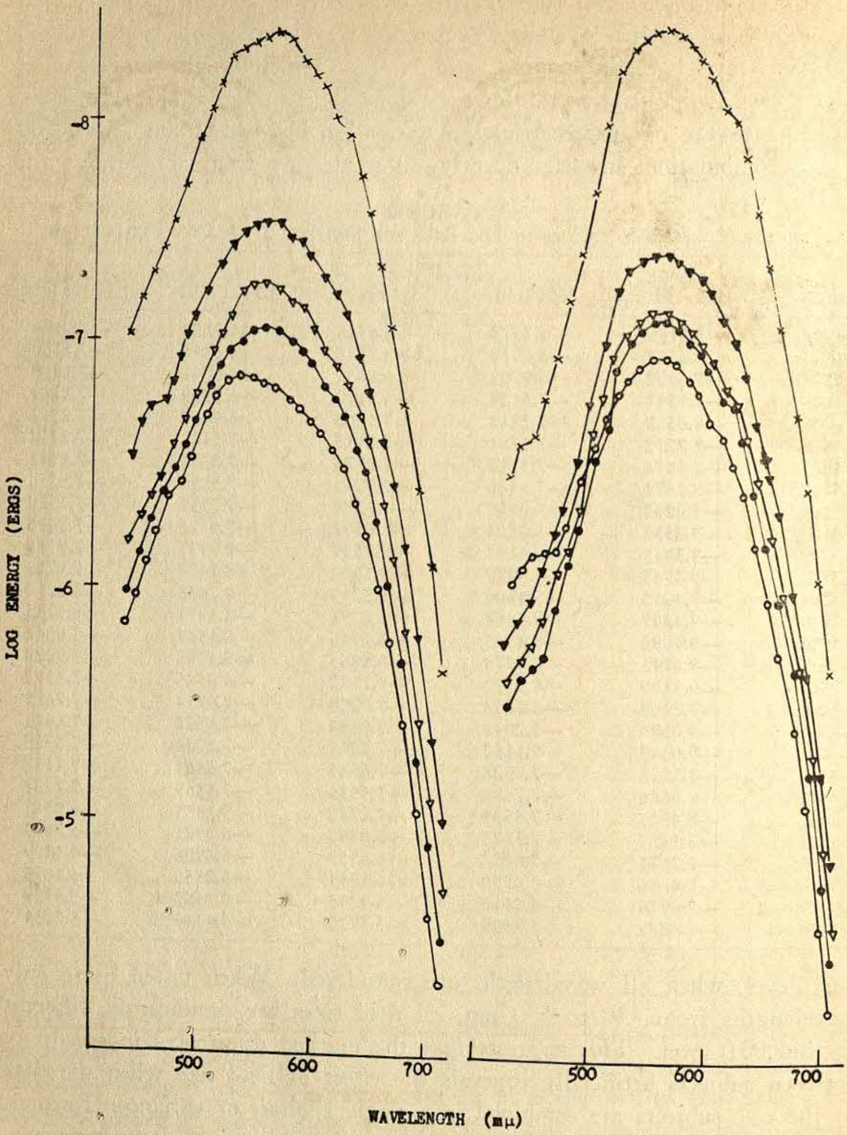

FIGURE 2
AVERAGE FOVEAL LUMINOSITY CURVES IN LOG ERGS FOR TWO SUBJECTS, FIVE CENTRALLY LOCATED, CONCENTRIC FIELD SIZES, AND TWENTY-EIGHT WAVELENGTHS
(The Data for Subject 1 are plotted on the Left; for Subject 2, on the Right. For both Subjects, open Circles represent the 100′ Field, closed Circles the 75′ Field, open Triangles the 50′ Field, closed Triangles the 25′ Field, and x's the 5′ Field.)

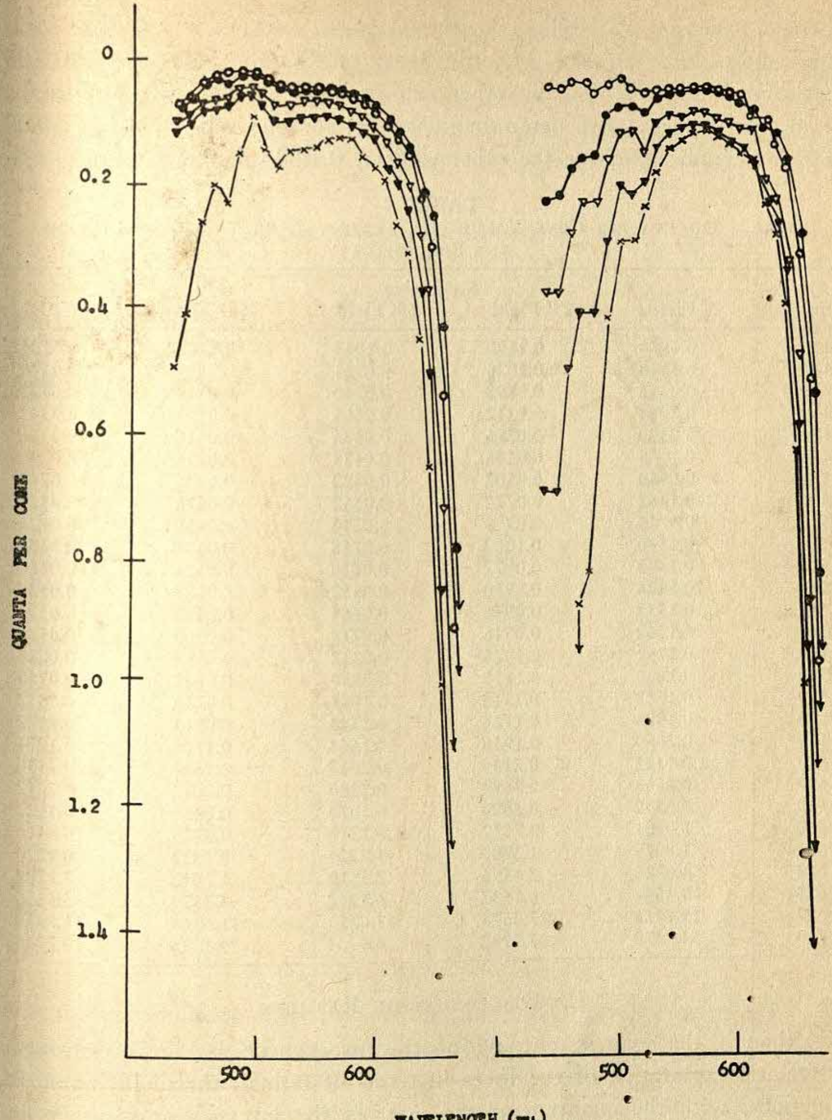

FIGURE 3
AVERAGE RATIOS OF QUANTAL ABSORPTIONS PER CONE FOR TWO SUBJECTS, FIVE CENTRALLY LOCATED, CONCENTRIC FIELD SIZES, AND TWENTY-EIGHT WAVLENGTHS

(The Data for Subject 1 are plotted on the Left; for Subject 2, on the Right. For both Subjects, open Circles represent the 100′ Field, closed Circles the 75′ Field, open Triangles the 50′ Field, closed Triangles the 25′ Field, and x's the 5′ Field.)

Session-to-session variability on the average was less than 0.15 logarithmic units. For one subject, only 3 per cent of the data exceeded 0.25 logarithmic units and for the other subject, only 14 per cent. Within a session, the range of five determinations was, for one subject, around 0.08 logarithmic units, and for the other subject, 0.10 logarithmic units.

TABLE 3
AVERAGE QUANTA PER CONE VALUES FOR SUBJECT 1, WITH 28 WAVELENGTHS AND FIVE FIELDS

	Field size				
λ(mμ)	5′ Field	25′ Field	50′ Field	75′ Field	100′ Field
430	0.4984	0.1190	0.1045	0.0782	0.0724
440	0.4140	0.1026	0.0988	0.0694	0.0690
450	0.2616	0.0798	0.0740	0.0414	0.0422
460	0.2084	0.0812	0.0664	0.0360	0.0342
470	0.2380	0.0786	0.0686	0.0416	0.0356
480	0.1498	0.0546	0.0488	0.0296	0.0278
490	0.0940	0.0502	0.0422	0.0258	0.0242
500	0.1462	0.0772	0.0552	0.0376	0.0328
510	0.1746	0.0998	0.0744	0.0496	0.0428
520	0.1540	0.1002	0.0738	0.0506	0.0464
530	0.1488	0.0972	0.0650	0.0524	0.0480
540	0.1426	0.0950	0.0652	0.0488	0.0520
550	0.1338	0.0946	0.0664	0.0482	0.0558
560	0.1242	0.0946	0.0718	0.0500	0.0586
570	0.1338	0.1076	0.0812	0.0582	0.0684
580	0.1600	0.1150	0.0880	0.0632	0.0780
590	0.1788	0.1312	0.1088	0.0740	0.0852
600	0.1998	0.1716	0.1398	0.0964	0.1072
610	0.2660	0.1956	0.1664	0.1128	0.1274
620	0.3142	0.2440	0.2040	0.1384	0.1570
630	0.4500	0.3694	0.2880	0.2050	0.2242
640	0.6552	0.5094	0.3670	0.2462	0.3022
650	1.0924	0.8572	0.7210	0.4276	0.5410
661	1.8974	1.3700	1.2220	0.7832	0.9220
673	4.0726	2.4596	2.5810	1.7642	2.1702
685	9.4678	6.1532	6.5962	4.7370	5.5306
697	19.8924	17.3678	13.6750	11.0544	14.7674
709	54.9470	37.9742	36.4902	29.4538	30.7748

E. DISCUSSION OF RESULTS

Although the express purpose of this experiment lay in presenting a systematic exploration of the fovea in terms of retinal, threshold luminosity functions, with the quantum as the unit, in the interests of accuracy and completeness, some attention should be given to the data as plotted in the traditional fashion. Due to the fact that quantal studies, as suggested previously, involve a certain amount of estimation of the retinal situation, it seemed advisable first to present the data in a form suited for comparison with published results. For this reason, the data in log ergs were included.

As compared with the generally accepted, classic curves of Graham and Hsia (7) and of Wright (29), as well as with those of Dillon and Zegers (4), Sperling and Hsia (19), and finally, also, with the standard normative curve, the I.C.I. function itself (8), the present data agree quite well in both shape and range. As far as range is concerned, it is usually measured from the maximum to either end of the curve. With a 700 mμ to 550 mμ range of from 1.0 to 1.7 log units, depending upon field size, the curves of this experiment fit neatly into the ranges established in the literature. With regard to shape, also, the agreement is favorable. The data of this investigation present the typical picture of the photopic luminosity curve, with a peak at 550-560 mμ and small inversions in the 450-490 mμ region. The only exceptions to this picture are to be found in the data for the largest fields for both subjects. Hence, where the field subtends 100 minutes of arc, a probable rod effect is observed in the heightened blue sensitivity in

TABLE 4

AVERAGE QUANTA PER CONE VALUES FOR SUBJECT 2, WITH 28 WAVELENGTHS AND FIVE FIELDS

	Field size				
λ(mμ)	5′ Field	25′ Field	50′ Field	75′ Field	100′ Field
430	1.7580	0.6928	0.3738	0.2256	0.0426
440	1.5798	0.6980	0.3786	0.2164	0.0464
450	1.1992	0.4966	0.2768	0.1756	0.0346
460	0.8748	0.4018	0.2306	0.1598	0.0384
470	0.8204	0.4030	0.2284	0.1520	0.0536
480	0.4114	0.2854	0.1584	0.0840	0.0392
490	0.2868	0.2013	0.1176	0.0696	0.0276
500	0.2852	0.2188	0.1098	0.0708	0.0420
510	0.2386	0.1952	0.1208	0.0810	0.0508
520	0.1746	0.1398	0.0994	0.0560	0.0482
530	0.1358	0.1172	0.0866	0.0464	0.0446
540	0.1220	0.1120	0.0874	0.0430	0.0422
550	0.1120	0.1088	0.0790	0.0406	0.0388
560	0.1102	0.1090	0.0806	0.0416	0.0408
570	0.1178	0.1198	0.0892	0.0462	0.0436
580	0.1250	0.1282	0.0932	0.0526	0.0540
590	0.1352	0.1380	0.1160	0.0606	0.0584
600	0.1762	0.1774	0.1146	0.0760	0.0830
610	0.2208	0.2252	0.1870	0.1026	0.0998
620	0.2480	0.2774	0.2364	0.1122	0.1342
630	0.3438	0.3898	0.3224	0.1588	0.1620
640	0.5858	0.6258	0.4770	0.2724	0.3120
650	0.9532	1.0110	0.8678	0.5208	0.5424
661	1.8210	1.5288	1.5450	0.8282	0.9738
673	4.3420	3.5568	3.6340	1.7062	2.1018
685	7.9738	7.9754	8.0924	5.0278	4.2122
697	18.4392	24.1908	20.7912	15.3740	15.7178
709	49.7112	51.3054	46.0988	31.6704	35.6334

the data of Subject 2 and in the tendency of the peak to move towards the shorter wavelengths as observed in the curve of Subject 1. Such behavior conforms to descriptions presented by both Kinny (16) and Wright (29) of mesopic influence. Too, the general effect of field size on threshold, matching well the work of Wright (29) and of Sperling and Hsia (19), is immediately apparent in the gradual widening of the curve as field size is increased, suggesting greater sensitivity with each increment in area. Finally, the pattern of the curves in the violet, suggestive of the phenomenon

TABLE 5
AN ANALYSIS OF VARIANCE ON SUBJECT 1, FOR ALL 28 WAVELENGTHS AND FIVE FIELD SIZES, WITH FIVE REPLICATIONS PER CELL

Source		df	Mean square	F	Sig.
Wavelength:	39,114,699,091	27	1,449,803,670	875.47	.01
Field Size:	231,417,127	4	57,854,293	34.94	.01
Interaction:	2,161,896,090	108	20,017,556	12.09	.01
Error:	927,376,367	560	1,656,029	—	—
Total:	54,990,807,497	699	—	—	—

TABLE 6
AN ANALYSIS OF VARIANCE ON SUBJECT 2, FOR ALL 28 WAVELENGTHS AND FIVE FIELD SIZES, WITH FIVE REPLICATIONS PER CELL

Source		df	Mean square	F	Sig.
Wavelength:	50,856,882,054	27	1,883,588,224	477.71	.01
Field Size:	235,949,702	4	58,987,426	14.96	.01
Interaction:	1,689,920,073	108	15,647,408	3.96	.01
Error:	2,208,055,668	560	3,942,957	—	—
Total:	54,990,807,497	699	—	—	—

TABLE 7
AN ANALYSIS OF VARIANCE INCLUDING 28 WAVELENGTHS, TWO SUBJECTS AND FIVE FIELD SIZES, WITH FIVE REPLICATIONS PER CELL

Source		df	Mean square	F	Sig.
Total	97,483,139,234	1399	—	—	—
Error	3,135,382,032	1120	2,799,448	—	—
Field Size	412,654,137	4	28,208,715	2.97	—
Wavelength	89,548,589,088	27	3,316,614,410	21.37	.01
Subject	56,993,165	1	56,993,165	—	—
Field Size vs. Subj.	54,712,738	4	13,678,184	2.35	—
Wavelength vs. Subj.	418,991,985	27	15,518,222	2.67	.01
Field Size vs. Wavelength	3,227,969,210	108	29,888,604	5.41	.01
Triple Interaction	627,846,877	108	3,813,397	2.08	.01

of foveal tritanopia, agrees closely with the curves presented by Thompson (21, 22, 23), Wright (29), and Sperling and Hsia (19). Hence, due to the agreement of the data with traditional curves and with data of recently published studies, it is assumed that the general correctness of the curves presented herein must be recognized. It is now possible to progress with some degree of confidence to a consideration of the obtained quantal estimates.

It must be observed that the data of this experiment closely resemble those published by Zegers (30) when appropriate wavelengths and field sizes are compared. The conformity between the data of these two studies is excellent especially when it is realized that calibrations, conditions, and methods all differed widely. The implications of this agreement, in terms of the retinal mechanism underlying threshold sensitivity will be further elaborated upon in a consideration of the area-intensity relationship. Here it suffices to note that the effective quantal flux density observed for maximal threshold sensitivity in the fovea lies in the neighborhood of one quantum per some six to 14 cones.

In considering the retinal luminosity curves obtained in the present experiment in greater detail, certain features are evident. One of these is the reduction in the difference in the ratio between threshold values taken at 430 mμ and 560 mμ, for all field sizes. For Subject 1, traditional plots of the data (cf. Figure 2) show a decrease in threshold from 430 to 560 mμ of the order of 10:1. When due allowances are made for the absorptions of the ocular media and macular pigment (cf. Figure 3), this ratio is reduced to less than two to one for all fields with the exception of the 5-minute field in which the ratio is five to one. For Subject 2, the data plotted traditionally (cf. Figure 2) the decrease in threshold between 430 and 560 mμ is of the order of 30:1. Again, when appropriate corrections are applied (cf. Figure 3), this difference is reduced to seven to one for the 5- and 25-minute fields, to five to one for the 50- and 75-minute fields and to one to one for the 100-minute field. These findings tend to support to some degree Wald's (24) finding that the loss in sensitivity in the blue which is traditionally observed in published luminosity curves uncorrected for the absorption of the ocular media and retinal elements, is a phenomenon based, not upon essential retinal sensitivity, but rather upon the differential effects of the absorptive humors and refractive mechanisms of the eye, through which light must pass to reach the photosensitive elements. Similar data are presented by Dillon and Zegers (4). Further corroboration is evidenced in Wald's (24) observations of individuals with aphacic eyes in which sensitivity in the violet is greatly augmented.

The quantal luminosity curves further show that sensitivity in the red end of the spectrum tapers off as wavelength 709 mμ is approached. There is no abrupt cut off point for red sensitivity, but rather, as the longer wavelengths are reached, more and more quanta per cone are requisite for a liminal flux density. From this it would appear that sensitivity in the red is primarily determined by the operation of the retinal elements themselves, rather than by the dioptric mechanisms and other media of the eye. Another aspect of this observed rapid heightening of threshold in the red is the amount of energy in a quantum in the red as compared to the amount of energy in a quantum of blue or green light. Wald (24) observes that the energy in a quantum drops off considerably as the longer wavelengths are approached. The energy in a quantum of red light at 700 mμ is approximately one-half that present in a quantum of light at 550 mμ. Obviously, if this is the case, a proportionately greater number of quanta will be required to trigger the photochemical reaction essential to the visual sensation when the light is composed of wavelengths near 700 mμ, than would be necessitated if the light were around 550 mμ. Hence, lowered sensitivity in the red is to be expected simply in terms of a larger number of quanta being needed for threshold. Therefore, it can be concluded that the rapid and progressive fall-off in sensitivity of the human eye as the longer wavelengths are approached, observed in the retinal luminosity curves of the present experiment, is a function both of retinal sensitivity itself, and of the lessening amount of energy in a quantum in that spectral region.

Of the other outstanding features exhibited by these retinal luminosity curves their relationship to field size cannot be ignored. As had already been observed in the results section, although extreme subject differences in absolute threshold values are observable, especially in the blue, still the data of either subject considered alone tend to fall into a pattern, as a function of field size. Increase in field size shows increased sensitivity throughout the spectrum, and especially in the blue. This is obvious from the way in which the curves span the intensity axis. Further, significance of the differences between sensitivity for different field sizes had been ascertained, not only by this observational analysis of the plotted data but also by statistical procedures described above. Only the two larger fields present any deviation from this pattern. Between these two fields considerable overlap is observable, generally indicative of the limits of summation and corresponding nicely with the suggestion of Graham *et al.* (6) that with larger fields, area and intensity become independent. Therefore, with the exception of the largest fields, the pattern of the inverse relationship between area and intensity (i.e., as field size increases the number of quanta per cone requisite for threshold decreases) receives additional confirmation in the data of the present investigation.

The question, however, of the complexity of the area-intensity relationship illustrated graphically in the several different functions descriptive of it, still remains. The curves of the present experiment suggest one reason why the desired general and repeatable function for this relationship has never been established. The key to this suggestion lies in the observable fact that the curves are not equally separated from wavelength to wavelength, but rather, that the differences between the curves, although all in the general direction of increased sensitivity with increased size, vary both within and between wavelengths. This suggests that the area-intensity relationship is a function of wavelength, as well as of other factors. Hence, lack of agreement between different studies is at least somewhat clarified since little attempt at exact specification and control of wavelength has been made. Further, the fact that, even among studies using white light as stimulus (6), descriptions of the area-intensity function are variant and restricted, can be explained at least partially in this context, for none of these studies specify the color temperature of the stimulus light. But since the spectral composition of white light can vary widely depending upon color temperature, wavelength effects could quite conceivably provide a complicating factor.

Another aspect of this area-intensity relationship to which this study is pertinent is the question of the underlying retinal elements involved. As will be seen, the basic agreement of the present data with that of Zegers (30), mentioned above, leads immediately to tentative support of Baumgardt's position (1).

Baumgardt's suggestion that the area-intensity relationship is delimited by the receptive retinal unit involved is highlighted by Zegers recent study (30). Baumgardt holds that the retina functions in terms of 'quasi-independent units' within which Ricco's law is valid and outside of which Piper's law describes the function. This investigator further relates these quasi-independent units to the cone-to-bipolar-to-ganglion retinal structure. In Zegers' monograph, a similar concept is enlarged upon in terms of threshold sensitivity. Zegers established the fact that for small and moderately sized foveal fields in the central range of the spectrum, one quantum per six to 14 cones is requisite for threshold. He further noted from Polyak's (18) data that, with the exception of the private b-h-s system, foveal cones are related to their bipolars in a ratio of between six to 12 cones to one bipolar. This leads to the conclusion that threshold stimulation is probably dependent upon retinal elements below the receptor layer, a concept also suggested by Willmer's work (28) which noted the critical area in the area-intensity function was the same as the extension of the influence of a single ganglion cell. This cone to bipolar to ganglion kind of relationship corresponds to Baumgardt's quasi-independent units and deserves further consideration in this regard.

To return for a moment to threshold considerations themselves, it requires only a small extension of the data to agree with the hypothesis presented by Zegers in an attempt to reconcile his data with the position of van der Velden and Bouman (2, 3) who propose the 'two-quanta' hypothesis of threshold stimulation. Zegers holds that this position is perfectly feasible in terms of his findings if the two quanta are involved in the stimulation of two bipolars, since it is admittedly possible that a single quantum touching off the photochemical reaction in a single receptor out of the possible six to 12, is sufficient to trigger the activity of the associated bipolar. Two such reactions, then, are sufficient for threshold stimulation according to this position. This amplifies van der Velden's analysis which demands the occurrence of these two reactions within a certain limited area. Since the data of the present paper agree substantially with that of Zegers, additional support is given to the work of both Baumgardt and van der Velden and Bouman from this source.

A final aspect to be considered in terms of these foveal quanta per cone luminosity curves is the question of the reported foveal tritanopia with small fields. As has been mentioned above, a loss in sensitivity in the blue with decrease in field size has been observed. That this loss is greater than would be proportionate in terms of the general loss of sensitivity in any spectral area to be predicted in terms of the area-intensity relationship has also been noted. Statistical evidence has been called upon to confirm this observation that the greatest differences in sensitivity due to stimulus size appear in the blue. However, no conclusive evidence concerning any disproportionate loss in the yellow, which is somehow associated with this effect, has been observed. This means that the data of the present paper basically agree with the work of Wright (29), Thompson (21, 22, 23), Konig (15), Willmer (26, 27), Sperling and Hsia (19), and Hartridge (9, 10, 11): all of whom observed the presence of this phenomenon when small stimulus fields were used.

Many explanations have been proposed to clarify the existence of this tritanopic-like effect. The first and most common of these is the suggestion, arising from Wald's (24) work, that the differential absorption of the macula lutea in foveal areas gives rise to this phenomenon. Such a position is taken by Galifert and Pieron (5) and suggested by Wright (29). However, it is demolished by Polyak (18) who holds that, since the tritanopic effect occurs in the central fovea where the macular pigment is thinnest, the absorption of this substance can hardly be responsible for it. Further evidence against such an hypothesis is supplied by Hartridge (9, 10, 11) who observes this phenomenon over the entire retina, even in peripheal areas where no pigment is present. Finally, in the present experiment, a log-log plot of the data argues against this position. For it has been empirically demonstrated (8) that the absorbing characteristics of a filter, such as the macula lutea has been postulated to be, when plotted in log-log form, yield curves whose shape is the same, although they are displaced along the intensity axis. In the present data, a log-log plot revealed not only change in the position of the curves along the intensity axis, but also alterations in the shape of the curves themselves. Therefore, it must be concluded that the tritanopic effect observed in the fovea with small fields is due to something other than macular absorption.

Before leaving the topic of the macula and its influence, it is well to note that the data of this investigation argue generally against any decided influence of this pigment on blue sensitivity. Medical examination showed substantial differences in pigmentation between the two subjects of this paper. Yet, the data presented herein reveals that the subject with the heavier pigmentation showed the greater sensitivity in the blue, while the subject who was less heavily pigmented possessed less blue sensitivity. Further, examination of the data of Subject Z in the work of Dillon and Zegers (4), showed that this subject too, possessed lowered sensitivity in the violet region of the spectrum in spite of the fact that ophthalmological examination[2] showed the depth of his pigmentation was only moderate. This is in contradiction to the suggestion made by Ishak (13) on the basis of his work with Egyptian subjects.

The second hypothesis presented to explain the tritanopic-like effect of small field sizes, places the responsibility in the absence, or marked decrement in number, of the blue receptors in the central fovea. This position conforms to the theory of color vision postulating three receptor systems in the eye. Placement of the responsibility for this phenomenon upon receptor sensitivity is suggested by Galifert and Pieron (5) and Thompson and Wright (22). Willmer (25) also considers that the explanation lies in retinal sensitivities holding that the rod free area is dichromatic and that the blue receptor mechanism is associated with rod vision. This position is generally considered speculative due to lack of anatomical support. Evidence of the present experiment, however, when combined with the data on small fields presented by Hartridge (9, 10, 11) appears to be tentatively against this position. Hartridge, using the matching technique with small fields, explored the whole retina and found this tritanopic-like effect wherever he worked. This conclusion is further supported by data on threshold work with small fields across the fovea showing no difference in sensitivity at any foveal location now available and contained in the unpublished Ph.D. dissertation of Sister Rita Flaherty.[3] Therefore, it would seem that the receptor units involved in this restricted area are similar throughout the retina, implying that the question is not to be answered merely in terms of the absence of blue receptors which would hardly be so widespread. Adding to this, the data from the present investigation which exhibits the decrement in blue sensitivity in the smallest field, as well as normal sensitivity when field size is increased, suggest that the process of integration of many units, each of which alone suffices to compose the small field, is involved in sensitivity in the violet. Therefore, it is proposed that this form of blue sensitivity decrement is not the equivalent of the absence or malfunctioning of the blue receptor system held to be the cause of the anomaly of color vision known as tritanopia but is rather a function of the integrative processes existing at or below the bipolar level of the retina. Such a position agrees basically with Baumgardt's (1) work, and fits reasonably well into Polyak's (18) theory that color vision is, indeed, mediated below the receptor level.

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[2] The ophthalmological examinations were performed through the kindness of Dr. Ira S. Jones, M. D.

F. SUMMARY AND CONCLUSIONS

This investigation studied foveal luminosity curve in quantal form. The known effects of stimulus area upon this function posed the issues involving foveal tritanopia with small fields and the basic area-intensity relationship.

The basic findings contained in this report include:

1. A general presentation of the quantal threshold luminosity function which shows basic agreement with the work of Zegers (30).

2. Because of the shape of the curves, a discussion of the limitations of sensitivity due to both the retina itself and/or to the differential absorptive

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[3] These data are to be found in the unpublished Ph.D. dissertation of Sr. Rita Flaherty, Fordham University, 1959.

characteristics of the dioptric mechanisms of the eye, was possible. In this connection Wald's hypothesis (24) regarding the variation of quantal energy with wavelength was discussed.

3. Confirmation of the general inverse relationship between area and intensity was presented, and suggestion as to the dependence of this function upon wavelength and retinal mechanisms [this latter in correspondence with Baumgardt's work (1)] were mentioned.

4. Finally, further evidence of the existence of foveal tritanopia with small fields was presented and a discussion of the possible causes of this phenomenon including Wald's (24) hypothesis regarding macular pigmentation, Willmer's (25) suggestion of a red-blue receptor, and a relatively new proposal in terms of retinal integration were presented.

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SOME CURRENT STUDENT ATTITUDES TOWARD PRESIDENTIAL CANDIDATES OF DIFFERENT CATEGORIES (RACIAL AND RELIGIOUS): I.*

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A. INTRODUCTION

During the last two decades effort has been made to observe any prejudice that may exist in American voters by taking nationwide samples of adults aged 21 and over and asking these people whether they would vote for qualified individuals who might be Catholic, Baptist, Jew, Negro, Atheist, or Woman.

College students frequently are not of voting age; yet when they reach their majority, they go to the polls and either strengthen the American ideal, which emphasizes that in the spirit of equality each person is judged on his own merits, or these young voters add to the existing prejudices of our times.

A report (2) to the Center for the Study of Democratic Institutions, *Our Own Kind*, has said:

> American electioneering has always given special attention to the ethnic and religious interests of the voters. History demonstrates that Americans bring to the polls their special backgrounds and pull down the levers congenial to their national origins and religious ties.

A poll in use for the past 20 years (the Gallup Poll) was adapted to elicit voting attitudes of college students. It also may provide some means for comparing the adult civilian population with collegians.

The authors' experience with college students in the total university setting has led to the fomulation of hypotheses concerning students' voting prejudices:

Hypothesis I: Students attending religious foundations are not more liberal than other students in accepting a candidate on the basis of his own merit.

Hypothesis II: A group of students from one religious foundation are

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[1] We wish to acknowledge the aid of the Human Relations Research Fund for compilation of statistical data.

not more liberal than those of another foundation in accepting a candidate on the basis of his own merit.

Hypothesis III: Arts and Science students are not more liberal than students of the other colleges in accepting a candidate on the basis of his own merit.

Hypothesis IV: Party classification is not associated with the liberality of the future voter; a group of students loyal to one major party are not more liberal than those loyal to the other major party or to a "No Party" group in accepting a candidate on the basis of his own merit.

In order to test these hypotheses a presidential poll was given students of one midwestern university in the school year 1959-1960. During the same period nationwide samples of adults were being gathered in order to predict the effect of prejudice upon the presidential election of 1960. The possibility of a Catholic running for office created more than hypothetical interest in this question.

B. Subjects

Subjects were divided into two major categories: (*a*) members of religious foundations and (*b*) members of various classes from the College of Arts and Science and from the College of Engineering.

Members of religious foundations were distributed as follows: (*a*) 72 members of a Catholic youth organization (Newman Club); (*b*) 38 members of a Jewish youth organization (Hillel); (*c*) 25 members of an Episcopal youth organization (Canterbury); (*d*) 27 members of a Baptist youth organization (Baptist Bible Union); (*e*) 78 members of another Baptist youth organization (Baptist Student Foundation); (*f*) 19 members of Evangelical United Brethen youth organization (E. U. B. Student Fellowship); (*g*) 51 members of a Methodist youth organization (Wesley); (*h*) 38 members of a Presbyterian youth organization (Westminster).

Various university classes were polled as follows. (*a*) 131 members of different sections of elementary courses in government; (*b*) 145 members of different sections of an upper class course in general studies (Great Issues); (*c*) 49 members of senior engineering courses.

C. Procedure

1. *The Poll*

Eight different forms of the poll were utilized, four with "Republican" first and four with "Democrat" first (Table 1).

TABLE 1

POLL ON VOTING PREFERENCE

Please do *not* sign your name, your reply is completely anonymous.

1. If your party nominated a generally qualified man for President, and he happened to be a Protestant, would you vote for him? (Please check)	1. No........, Not sure........, Yes........
2. If your party nominated a generally qualified man for President, and he happened to be a Negro, would you vote for him? (Please check)	2. No........, Not sure........, Yes........
3. If your party nominated a generally qualified man for President, and he happened to be a Jew, would you vote for him? (Please check)	3. No........, Not sure........, Yes........
4. If your party nominated a generally qualified man for President, and he happened to be a Catholic, would you vote for him? (Please check)	4. No........, Not sure........, Yes........

Remember, do *not* sign your name

Please check: Man........ Woman........ Age at last birthday (Please fill in): ....

College class: Freshman........, Sophomore........, Junior........, Senior........, Graduate........

Please check which party you belong to or are most sympathetic with:

Republican........, Democrat........, other........, no party

The four categories were arranged in each of the four orders indicated in Table 2.

TABLE 2

(a)	(b)	(c)	(d)
Catholic	Jew	Negro	Protestant
Jew	Protestant	Catholic	Negro
Negro	Catholic	Protestant	Jew
Protestant	Negro	Jew	Catholic

These arrangements provided that each category would appear in the first position and in the last position and each category would be preceded and followed by each other category. It was hoped that this kind of arrangement would be sufficient to cancel any advantage of position for any category.

2. *Administration*

Questionnaires were supplied to the leaders with the eight arrangements rotated in order to insure that as the papers were handed out at a religious foundation meeting or in a class, all of the different orders would be distributed evenly.

A clergyman or the classroom teacher, after distributing the papers, read the oral instructions. There was no time limit for taking the poll which was completed quickly by the subjects.

(Directions to be read by the instructor)

> May we enlist your cooperation. We would like to have your voting preference for presidential nominees, in terms of characteristics rather than in terms of individuals. Will you please check the form you will now receive thereby indicating your preference.
>
> Do not sign your name because your reply is to remain completely anonymous. However, please do check the blanks at the bottom of the page giving information about your college class, your age, and so on.
>
> We appreciate your cooperation. Your response will help us understand voting trends.

D. FINDINGS

An early inspection of the Protestant groups suggested that there were probably two separate populations represented by the various Protestant religious foundations. They were, therefore, divided into two groups, called Protestant *A* and Protestant *B*. The 12 possible differences were then investigated and it was found that there were two differences at the .001 level, two differences at the .01 level, one difference at the .05 level and two differences at the .10 level. Considering only those five differences at the .05 level or above, it was apparent that this was way beyond chance within 12 possible comparisons. Therefore, from that point on, the two Protestant groups were kept separate.[2]

The number of choices of the seven sub-groups, three from university classes and four from religious foundations, are presented in Table 3 which reads: "If the candidate were a ————, would you vote for him? Yes (+), not sure (0), no (—)." The percentages of choices within each group for each level for each category are presented in Table 4.

Differences significant at the .05, .02, .01 and .001 level are presented in Table 5 which reads: "Catholic students voted significantly more often than the Protestant *A* group that they would vote for the best man if he were a Catholic." Farther down in the table, it reads: "The students in the Great Issues classes stated significantly more often than the Jewish students that they would not vote for the best man if he were a Catholic."

The first two groups in Table 5, the Catholic students and the Jewish students, are with one exception higher than almost all of the other groups on being willing to vote for each one of the categories of the presidential candidate. The next two groups, Protestant *B* and Protestant *A*, constitute in a sense a transition group in their attitudes, with a number of groups that they are higher than in favoring a candidate regardless of his category (Protestant *B*) but with some uncertainties and some adverse choices coming in. The second of these transition groups, Protestant *A*, expressed a great

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[2] All tests of significance involved in this study were of a two-tail nature and calculated in the manner indicated in Downie for testing the difference between two percentages (1).

TABLE 3

CHOICES: UNIVERSITY COURSES AND RELIGIOUS FOUNDATIONS (N = 673)

		Great Issues	Engineers	Government Classes	Jews	Catholics	Protestants "B"	Protestants "A"
N		145	49	131	38	72	114	124
Catholic	+	94	22	84	31	64	75	52
	0	27	17	29	7	5	20	47
	—	24	10	18	—	3	19	25
Jew	+	84	24	77	36	55	76	62
	0	39	16	37	2	15	31	47
	—	22	9	17	—	2	7	15
Negro	+	52	10	41	27	51	76	60
	0	48	17	43	10	13	27	46
	—	45	22	47	1	8	11	18
Protestant	+	135	41	123	33	65	104	115
	0	9	7	8	5	6	10	9
	—	1	1	—	—	1	—	—

TABLE 4

PERCENTAGES OF CHOICES: UNIVERSITY COURSES AND RELIGIOUS FOUNDATIONS

		Great Issues	Engineers	Government Classes	Jews	Catholics	Protestants "B"	Protestants "A"
	N	145	49	131	38	72	114	124
Catholic	+	64.83	44.90	64.12	81.58	88.89	65.79	41.94
	0	18.62	34.69	22.14	18.42	6.94	17.54	37.90
	—	16.55	20.40	13.74	0.00	4.17	16.67	20.16
Jew	+	57.93	48.97	58.78	94.74	76.39	66.67	50.00
	0	26.90	32.65	28.24	5.26	20.83	27.19	37.90
	—	15.17	18.24	12.98	0.00	2.78	6.14	12.10
Negro	+	35.87	20.40	31.30	71.05	70.83	66.67	48.39
	0	33.10	34.69	32.82	26.32	18.06	23.68	37.10
	—	31.03	44.89	35.88	2.63	11.11	9.65	14.52
Protestant	+	91.10	83.67	93.89	86.84	90.28	91.23	92.75
	0	6.21	14.28	6.11	13.16	8.33	8.77	7.26
	—	.69	2.04	0.00	0.00	1.39	—	—

TABLE 5
SIGNIFICANT DIFFERENCES BETWEEN GROUPS: DIFFERENCES AT .05 OR BETTER

If candidate were a:	—	0	+
		1. *Catholics higher than:*	
Catholic			Protestant A Protestant B "Great Issues" Government Engineers
Jew		**Jews	Protestant A *"Great Issues" *Engineers *Government
Negro			"Great Issues" Engineers *Protestant A **Government
		2. *Jews higher than:*	
Catholic			Protestant A Engineers **Government **"Great Issues"
Jew			Protestant A Protestant B Engineers Government "Great Issues" *Catholic
Negro			"Great Issues" Government Engineers *Protestant A
		3. *Protestant B higher than:*	
Catholic	Jews *Catholics	**Catholics	Protestant A *Engineers
Jew	*Jews	*Jews	Protestant A Engineers
Negro			"Great Issues" Government Engineers *Protestant A
		4. *Protestant A higher than:*	
Catholic	Jews Catholics	Catholics Protestant B "Great Issues" *Government **Jews	
Jew	Jews **Catholics	Jews *Catholics	
Negro		*Catholics **Protestant B	Engineers *Government **"Great Issues"

** .05; * .02 or .01; blank .001

TABLE 5 (continued)

If candidate were a:	—	0	+
	5. *"Great Issues" Courses higher than:*		
Catholic	Jews *Catholics	*Catholics	Protestant A *Engineers
Jew	Jews *Catholics **Protestant B	*Jews	
Negro	Jews Protestant A Protestant B *Catholics	**Catholics	**Engineers
	6. *Government Courses higher than:*		
Catholic	Jews **Catholics	*Catholics	Protestant A **Engineers
Jew	Jews *Catholics	*Jews	
Negro	Catholics Jews Protestant A Protestant B	**Catholics	
Protestant			**Engineers
	7. *Engineers higher than:*		
Catholic	Jews *Catholics	Catholics *Protestant B **"Great Issues"	
Jew	Jews *Catholics *Protestant B	*Jews	
Negro	Catholics Jews Protestant A Protestant B	**Catholics	

** .05; * .02 or .01; blank .001

deal of uncertainty and also some adverse attitudes. The next two groups, the "Great Issues" classes and the government classes show much more choosing against a category of candidate, although they also have a few instances of being more favorable than some other group to various categories of candidates. Finally, the last group, the engineers, exceed no groups at all in planning to vote for the best man regardless of his category and they display much higher uncertainty and very much higher anti-attitudes than the other groups towards all categories of candidates except the Protestant category. There is no significant difference relative to a candidate who is a Protestant except one difference at the 5 per cent level, the government classes being more favorable to the Protestant candidate than the engineers.

The choices of the students by party affiliation, "No Party," "Republican," or "Democrat," are presented in Table 6. It should be noted that only 12 of the 673 students gave some "other party" designation. Since there were so few, they were omitted from Table 6. The comparisons of each political group with each other group at each level for each category of candidate are also presented in Table 6. It can be seen that there are 11 statistically significant differences by party affiliation amongst the 36 possible comparisons, again, differences way beyond a chance occurrence. Table 7 presents these comparisons in terms of which party group is higher than which other party groups for a given category at the different levels of choice.

TABLE 6
ALL GROUPS COMBINED BY PARTY (N = 661)*

		Percentages			Comparison of choices: *p*		
		No Party	Republican	Democrat	Republican vs. No Party	Democrat vs. No Party	Democrat vs. Republican
	N	149	348	164			
	+	64.4	57.8	70.1	**	**	.01
Catholic	0	24.8	25.6	16.5	**	.05	.02
	—	10.8	16.6	13.4	.10	**	**
	+	63.8	57.5	68.9	**	**	.02
Jew	0	28.8	31.0	18.3	**	.05	.01
	—	7.4	11.5	12.8	.10	.10	**
	+	53.0	42.8	50.6	.05	**	.10
Negro	0	30.9	32.2	25.6	**	**	**
	—	16.1	25.0	23.8	.05	.10	**
	+	85.2	92.5	93.9	.02	.01	**
Protestant	0	13.4	7.5	5.5	.10	.05	**
	—	1.4	—	.6	**	**	**

* Since only 12 persons said "other party" they were omitted from this table.
** *p* greater than .10.

Table 7 indicates that the "No Party" group is more favorable to the best man, if he is Negro, than the Republicans, without being significantly against any category, yet the "No Party" group is significantly more doubtful than the Democrats in three out of four categories. The "Democrat" group is more in favor of any category of candidate than the Republicans and the "No Party" group. The "Republican" group is significantly more often in favor of a candidate regardless of his category only in the case of a Protestant candidate (whom they are more strongly for than the "No Party" group) while at the same time they are more uncertain about two of the four

TABLE 7
SIGNIFICANT DIFFERENCES BY PARTY AFFILIATION (N = 661)

If candidate were a:	—	0	+
		1. *No Party higher than:*	
Catholic		**Democrat	
Jew		**Democrat	
Negro			**Republican
Protestant		**Democrat	
		2. *Democrats higher than:*	
Catholic			*Republican
Jew			*Republican
Negro			
Protestant			*No Party
		3. *Republicans higher than:*	
Catholic		*Democrat	
Jew		*Democrat	
Negro	**No Party		
Protestant			*No Party

** .05; * .02 or .01

categories than the "Democrats" and significantly more against one out of the four categories than the "No Party" group.

It was felt that possibly the experience (or the selection) of being in the Great Issues classes might produce a somewhat different attitude towards the choice of a best man versus attention to his category than would be the case in the general student group. The choices of the 145 students in the Great Issues classes were grouped by party affiliation. Out of the 36 possible comparisons, only two reached the .05 level or better. It was therefore concluded that the population of the Great Issues Classes, seniors in college for the most part, are recognizably different in their attitude towards categories of candidates from the general population of 661 students (which includes the 145 Great Issue students) grouped by party affiliation.

It may be of interest to note what are the announced party affiliations of students in Religious Foundations. This material is presented in Table 8.

TABLE 8
PARTY AFFILIATION OF RELIGIOUS FOUNDATION MEMBERS

		Percentages			
	N	Jews 38	Catholics 72	Protestants B 114	Protestants A 124
Republican	165	21.0	23.6	59.6	58.1
Democrat	88	42.1	40.3	16.7	19.4
No Party	87	34.2	31.9	21.0	21.8
Other	8	2.7	4.2	2.7	.7
Total	348	100	100	100	100

The question arose as to whether longer experience in college as such might affect the attitude of a prospective voter concerning whether or not he would vote for the best man regardless of category. No significant differences appeared between the seniors and any other college class level in any voting attitude towards a candidate of any category. Only two out of 36 comparisons reached the 5 per cent level. (N = seniors, 285; juniors, 107; sophomores, 97; freshmen, 131.)

Since differences had appeared between the students in the Religious Foundations and students in the university courses that were polled, a separate tabulation was made by college class level for the Religious Foundations and for the university courses. Graduate students were compared with each of the undergraduate classes in the Religious Foundations. (N = graduate students, 52; seniors, 63; juniors, 52; sophomores, 72; freshmen, 109.) Seniors were compared with each of the other three classes in university courses. (N = seniors, 222; juniors, 55; sophomores, 25; freshmen, 22.)

Enough differences reach significance or approach significance in the Religious Foundation group to suggest that there may be genuine differences between the graduate students and the underclassmen. (Graduate students were higher in choosing a Jew than seniors (.05) and freshmen (.10); seniors were more uncertain about a Jew (.05); graduate students were higher in choosing a Negro than seniors (.10), sophomores (.01) and freshmen (.01); sophomores were more uncertain about a Negro than graduate students (.01), as also were freshmen (.02).) The general picture which emerges is that of the graduate students being more liberal in the sense of considering the man rather than his category and of the underclassmen being distinctly more unsure of themselves which is indicated by the number of times that the zero category (unsure) is higher for the underclassmen than for the graduate students.

Inasmuch as there are only two differences at the .05 level or better, a number which could easily have occurred by chance, among the comparisons between seniors and lower classmen in the college classes, it seems apparent, again, that staying longer as an undergraduate in college does not change one's freedom to consider the individual on his merits aside from his category as a candidate.

E. STATUS OF HYPOTHESES

Hypothesis I, that students attending Religious Foundations are not more liberal than others in accepting a candidate on his own merit is rejected, disclosing the finding that students attending Religious Foundations apparently are more liberal than the general student body in accepting a candidate on the basis of his own merit.

Hypothesis II, that a group of students from one Religious Foundation are not more liberal than those from another Foundation in accepting a candidate on the basis of his own merit, is similarly rejected, leaving the discovery that there are differences amongst students in different Religious Foundations in their liberality about accepting a candidate on the basis of his own merit.

Hypothesis III, that Arts and Science students are not more liberal than students of the other categories in accepting a candidate on the basis of his own merit is also rejected. It is apparent that, at the university in question, the Arts and Science students (those in the Great Issues classes) are more liberal than the Engineers in accepting a candidate on the basis of his own merit. (Both the Great Issues Classes and the Engineering Classes in this study are almost all seniors in college.)

Hypothesis IV, that party affiliation is not associated with the liberality of the future voters (that a group of students loyal to one major party are not more liberal than those loyal to the other major party or to a "No Party" group in accepting a candidate on the basis of his own merit) is also rejected. It is apparent in the present poll that the affiliation of a student, possibly through the family pattern, to one major party or to the other major party or to a "No Party" position corresponds to differences with respect to whether the future voter would consider a candidate on his individual merits or in terms of the category to which he belongs.

F. DISCUSSION

There is a high degree of uncertainty registered by the students in this study. Perhaps this is because no attempt was made by the researchers to force respondents into a "yes" or "no" category. The polling pattern is different from that of the Gallup Poll where interviewers read the question and then hand the respondent a card, listing the names of the candidates, on which respondents are expected to answer "yes" or "no." "On this card there is no 'don't know' or 'not sure' category. . . . Thus there is a 'forcing' of respondents to this extent."[3]

The percentage of students who responded "not sure" might suggest confirmation of the idea that people in universities live in ivory towers, oblivious of the world around them, or it might indicate something more positive, that young people while at school try to discover some of the answers to life; students may be uncommitted, not out of indifference but because they are searching for the right answer. Uncertainty may denote another step forward.

---

[3] Information from personal correspondence with George Gallup, Jr., 6-22-60.

Students live in a society where their elders have followed a practice of selecting only a white Protestant as president. The college student may feel a sense of uncertainty as he observes that both the parties' and voters' practice contradicts the constitutional provision which explicitly declares that a man's religion is not a proper test of fitness for public office. Given sufficient time for maturation perhaps the collegian may become more accepting than his elders.

While there are widespread differences between faiths polled on the question of accepting presidential candidates of various backgrounds, students attending religious foundations are less rejecting than the general student. This is true even when the religious groups are compared with the Great Issues and the Government classes. Catholic and Jewish students (see Table 5) with one exception, are higher than all other groups in their willingness to vote for a presidential candidate regardless of race or religion. The Catholic Student Foundation population is religiously most traditional, while a large majority of Jewish Foundation students are not associated with the Orthodox, traditional synagogue. However, both groups register the most positive feelings toward all candidates.

In the case of the Catholic and Jewish students one might say that their high affirmative acceptance of many other minorities may be in part due to their own minority status. However, the Foundation Protestants are also less rejecting than the general student body. This may indicate that while the common heritage of all these religious groups may not be strong enough to cause individuals to overcome their anxieties and accept all men on the basis of their ability, still religious principles of social justice will possibly not permit these young people to reject candidates as readily as do most other students.

That the avoidance of negative feelings is no small feat was emphasized by a sage in the first century. Hillel felt the achievement of the program "to love one's neighbor as oneself" required an initial avoidance of hate. His advice was "Do not do to others what you would not have others do to you."

Students on the whole state their convictions on the political issue and seem to believe that the party they choose maintains their same attitude (see Table 7). Those who do not affiliate, "No Party," are somewhat more uncertain about accepting presidential candidates of various categories than "Republicans," but the "No Party" group is at the same time less negative than the "Republicans," toward a presidential candidate from one minority group. Compared to "No Party" and "Republicans" the "Democrats" are more accepting of candidates from minority groups.

On the contrary, students of "Great Issues" do not relate their choices with party policy. These arts and science students, mostly seniors, may, after studying about American politics, believe all parties are committed to the same democratic principles, with the intensity of such sentiment in each party merely varying from region to region. "Great Issues" students, aware of party commitments, may in the future exercise their rights as voters to raise the level of each party so that principle and practice are more alike.

What accounts for the difference between students from the schools of liberal arts and of engineering? Does the liberal arts curriculum broaden students' outlook or does the school program attract students with tendencies to be free from prejudice? Schools concerned about fulfilling civic responsibilities may wish to explore further the differences and similarities between students of various schools on many social issues.

The present study did not attempt to define in any way what "a generally qualified man" is for the office of President of the United States. It is obvious that many questions exist about what constitutes being well qualified for this difficult and crucial office and that seeming prejudice might in reality be an uncolored judgment about qualifications for the office. However, there probably is some approach to the measurement of prejudice or fair mindedness in the present study since no *individuals* were under consideration and since four different classifications of candidates, separate from their abilities, were presented together for consideration.

Because of the particular selection of subjects in this study the findings are not known to have application beyond this group. For instance, other studies have shown that in general more education is associated with less prejudice, which suggests that the present subjects have perhaps shown less prejudice than would non-college subjects of the same age group.

Longitudinal studies are needed to determine what continuity there is in an individual's attitudes in the area while he is in college and his attitudes in the next 15 or 20 years thereafter.

Since only one university was sampled in the present study, it is also not known how far the present findings would obtain in a widely different section of the country and in a different type of college, for instance, a small private, liberal arts college, enrolling only men or only women.

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THE OTHER PERSON: HOW WE "INTEND" IT*

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---

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A. FRANZ BRENTANO'S INTENTIONALIST APPROACH

When the question arises how to deal with another person, it is an intentionalist-existentialist question. In the course of my life, I, an existing individual, encounter other existing individuals, as well as non-personal, existing objects. If I feel that another person, crossing my path, or any "thing" that I come upon, is of significance to myself, I relate myself to such objects in a variety of psychic modes.

Aristotle and the Schoolmen conceived the ego-world relationship in this existential sense (35, p. 58; 48, pp. 142, 154; 26, p. 305; 2, 425a 14). F. Brentano, thoroughly trained in scholasticism for priesthood, regarded this relationship as the cogent subject-matter of psychology. Accordingly, he considered the individual's psychic life as a stream of varying *acts*, being directed upon encountered *objects*; or, in the scholastic parlance: psychology deals with the stream of varying acts whereby an individual "intends" encountered objects (4;19, Ch. 5).

B. GENERALIZING FROM BRENTANO'S INTENTIONALISM TO NEO-INTENTIONALISM

While sharing Brentano's intentionalist doctrine, we shall generalize from it considerably in the light of post-Brentano developments to what may be called neo-intentionalism.

Though his teachers, Aristotle and Thomas Aquinas, emphasized the "union of acts" in the "whole soul" (2, 412a3-415a13), Brentano considered only conscious psychic acts (4). The neo-intentionalist approach pursued here deals, however, also with unconscious acts. Moreover, neo-intentionalism extends its purview to infrapsychic acts, that is, to the vegetative acts, which maintain the physiological equilibrium; and the subcortical acts, coping with stress and emergencies. Indeed, neo-intentionalism subscribes to an organismic self-psychology, which states that all acts, conscious and unconscious, can be manifestations of the conscious and unconscious self-structures (10, p. 407; 39; 1, pp. 36-62; 33, p. 235). Accordingly, research into acts, for example into interpersonal perception, must insist on disentangling the effects of the conscious and unconscious self-structures upon acts.

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[1] Paper, delivered at the XVIth International Congress of Psychology, Bonn, July 31-August 6, 1960.

With Brentano's intentionalism thus generalized, we are ready to turn to interpersonal perception.

C. INTERPERSONAL PERCEPTION

1. *Self-Other Appraisal*

Both the phenomenal view and the "New Look" research into perception suggests that in encountering another person, sensed as significant to ourselves, we relate ourselves to him by the act of social perception. Actually, we address ourselves not only to him, but also simultaneously to our own self; and this we effect by an act of self-other appraisal (49, 7, 3).

The motive underlying self-other appraisal is, broadly speaking, the vital necessity to ascertain mutual compatibility or incompatibility, with a view to possible harmonious or inharmonious inter-action or inter-communication (22, p. 51). Thus, in interpersonal encounters, we have, first, a diagnostic concern about "the other," and then, possibly, a social concern.

The "New Look" research into perception suggests that self-other appraisal proceeds from predominantly subcortically controlled "subception," which is too fast to be recognized consciously, to predominantly cortically controlled perception, which is a conscious act (30).

2. *The Results of Self-Other Appraisal*

Self-other appraisal leads essentially to relational judgments, educed from the fundamentals of self-appraisal and appraisal of "the other."

Since an individual encounters other individuals innumerable times, myriads of self-other appraisals are concomitantly being made, producing of necessity ever-ready neural engrams (7, p. 702; 20). These dispositions make for the swiftness of the self-other matching act. Nevertheless, these processes are not always arrived at on the basis of previous experiences. Frames of reference, which underlie social perception, occasionally change abruptly.

3. *The Self as Frame of Reference in Self-Other Appraisal*

In this self-other matching process, the percipient's self-image, which he—if mature—carries with himself in constant readiness, is an ever-co-conscious frame of reference in all encounters (44, p. 330f; 48, p. 314; 29; 24; 7, p. 701; 38). The individual can grasp in inner perception his self-image, with "all its qualities, feelings, and relations, its contents and objects," as Th. Lipps insisted (28, p. 187). If we perceive another individual in a self-involved way, then we match "the other" with ourselves. This confrontation, to be sure, is not meant as the phenomenological viewing together of two "pure egos," as conceived by Husserl (23), but as the phenomenal experiencing together of two concrete, living persons (22, Ch. II).

Self-other matching can be predominantly objective. The social distance between the perceiving and the perceived person is then grasped realistically. Self-other appraisal may also be autistic on the part of the percipient. Unable to countenance objectively his self-image side by side with the other person's image, the percipient misperceives the other individual (43, pp. 136-149). The ensuing relational judgment will then become distorted.

4. *Self-Other Compatibility*

The outcome of this self-other matching on the part of the percipient will be a sense of congeniality or uncongeniality, of amity or enmity, or perhaps of strangeness (6, p. 94).

5. *The Reaction-Time in Perceiving "Friends" or "Enemies"*

In interpersonal perception, the differential reaction-time in perceiving "friends" or "enemies" is very significant. We are touching here on the broader aspects of the psychophysics of personality perception (38, 37).

As stated by Mueller-Freienfels, "every perception, every act or thought or will is not merely an experience of consciousness; the psychophysical self in such acts adopts a simultaneously active and sensitive attitude toward a real or imagined object" (36, p. 277/8).

German *Schichtentheorie* (the theory of personality stratification) (45, pp. 33-35, 85; 15, 16, 17, 18), and the American "New Look" in perception-research have been probing into this aspect. The latter research reveals that social congruity is generally perceived (that is, by the predominant perceptional type of personality)—and also learned and remembered (27)—faster than social incongruity (8). Also, where a subject is personally highly involved, he will respond with a lowered autonomic threshold, as measured by galvanic skin response (42; 32; 30; 6; 5; 25, p. 13).

6. *Explicit and Implicit Interpersonal Perception*

As the self-structure of the percipient is partly conscious and partly unconscious, self-other matching may be pulled in two different ways, resulting in conflicting self-other appraisals.

Thus, on encountering another person, I may relate myself to him by two conflicting perceptual acts: consciously, I may approach him in an accepting manner and may display the corresponding explicit behavior; unconsciously, however, I may dislike something about him and may manifest accordingly an implicit negative behavior. How to disentangle these discordant perceptions of others and to bring them experimentally into separate view, will be described in the following section.

D. INTERPERSONAL DIAGNOSIS OF PERSONALITY BASED ON INTERPERSONAL PERCEPTION

1. *Rationale of the Technique*

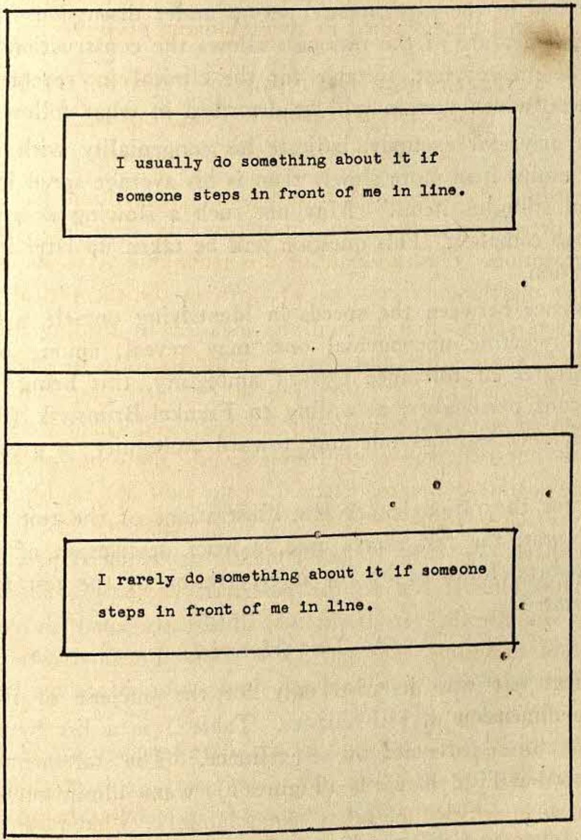
The preceding discussion of interpersonal perception has prepared the ground for presenting a technique of personality diagnosis, based on interpersonal perception. The rationale of this technique takes its departure from the self-other matching process, as set forth in the theoretical discussion.

The subject is told that he will be exposed to reading about situations from another person's life and that he must indicate in each case whether or not he identifies himself with the other's attitude. This arrangement was designed to stage experimentally interpersonal encounters, involving, to be sure, only one real person, the testee; while the other person is suggested by statements printed on cards exposed to the subject's reading, and reflecting the motive which governs the person who is suggested in the cards.

We are sharing here F. Heider's view that in social perception the percipient relates himself not to the perceived person's *behavior,* but to his *personality,* manifesting itself in varied motivational pursuits, emotions, thoughts, and meanings (22, pp. 33/4; 21). Personality is indeed a phenomenal fact. It can, as MacLeod insists, be perceived as a temporal, dynamic configuration (34).

It should be added—and this is essential to the nature of interpersonal perception—that by dynamic configuration we must understand the momentary *situation* in which "the other" finds himself. That means that we must gain insight into the other's situational perception by grasping intuitively the motive behind it. To be of scientific value, such a direct phenomenological view must be validated by objective criteria. The following description of the diagnostic technique based on interpersonal perception will show an attempt in this direction.

The stimulus material used in this technique is arranged in sets of two situations for each set: one situation suggests an individual who is prompted by a particular outspoken motive; while the other situation reflects an individual in whom the same motive is weak. Having to identify himself with one and the other role—out of turn, to be sure—the subject will manifest his preferred attitude (Figure 1).



I usually do something about it if someone steps in front of me in line.

I rarely do something about it if someone steps in front of me in line.

FIGURE 1

The author calls this technique the technique of "cross-examination." It was first applied to *projective* stimulus material (12, 13, 14). Since the interpretation of projective responses, combined with the cross-examination technique, is time-consuming, the author is now applying the technique to *objective* stimulus material in the form of paired statements. The rationale up to this point lends itself to one version of a test for interpersonal diagnosis of personality, suitable for mass administration.

In addition to registering the identifications with, and the rejections of, contrasting motivational statements by an objective method, the *speed* at which identifications and rejections are made, is likewise recorded objectively. Though the latter scoring is objective, it qualifies the subject's interpersonal identifications and rejections. Thus, a projective effect is gained by an objective method in the experimental set-up under discussion (31, p. 361). This additional feature of the rationale allows the construction of a second version of the present test, suitable for the clinical interpretation of individual subjects, which version will be described in what follows.

A subject may, for example, indicate his congeniality with respect to a particular stimulus item more slowly than is his average speed in responding to "congenial stimulus items." May not such a slowing down stem from an unconscious complex? This question will be taken up later in the section on interpretation.

The difference between the speeds in identifying oneself with congenial motives and rejecting uncongenial ones may reveal, among other things, a subject's degree of tolerance toward ambiguity, this being a significant characteristic of personality, according to Frenkel-Brunswik (11, p. 171). A small difference signifies tolerance toward ambiguity; a great difference, intolerance.

So much for the rationale. A few illustrations of the test material, the presentation unit, the test sheets used, a brief description of the administration procedure, followed by the interpretation of the test findings, will now be presented.

2. *Test Material*

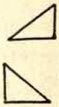
The present test was designed only for the purpose of illustration to appraise the dimension of self-reliance. Table 1 is a list by categories of diagnostic situations patterned on self-reliance.[2] The statements of this list, printed singly on 6" × 4" cards (Figure 1), were administered in random order to students of Wheaton College, Norton, Massachusetts. Interspersed among these cards are cards with distractor items, unrelated to self-reliance, which I refrain from showing here for lack of time.

---

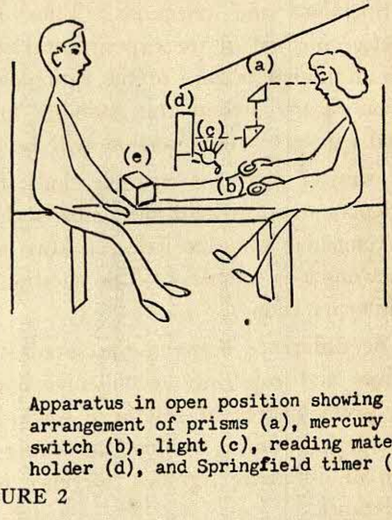
[2] Adapted from the California Test of Personality; Grades 9, College.

3. *Presentation Unit*

A device had to be secured for the recording of the dual responses elicited in this test, namely, the subject's choice between congeniality and non-congeniality in each diagnostic situation; and the speed at which this choice was made. Such a device was found in a presentation unit, used by W. Shipley in experiments on decision-time of affective judgment (46, 47, Figure 2).



Arrangement of prisms with apparatus in closed position.



Apparatus in open position showing arrangement of prisms (a), mercury switch (b), light (c), reading material holder (d), and Springfield timer (e).

FIGURE 2

4. *Testing Procedure*

The experimenter flips one statement at a time into the subject's view by means of the described presentation apparatus. The subject reads, for example, the following statement, appearing in the shutter: "It is hard for me to go on with my work if I do not get enough encouragement." Each exposure of a stimulus item such as this starts simultaneously an electric timer.

After reading the exposed item, the subject indicates promptly his choice as to congeniality with or rejection of the statement by pushing one of two buttons, thereby also stopping the timer. The tester can see the subject's choice, that is, his "approving" or "disapproving" finger, in a mirror.

TABLE 1*

Random numbers		+ Self-Reliance — Lack of Self-Reliance	Reaction Time		Before Inquiry	After Inquiry
			Rejection	Identification	+ —	
6	+	1. I usually do something about it if someone steps in front of me in line.	4.27		—	—
7	—	2. I rarely do something about it if someone steps in front of me in line.		2.84	—	—
9	+	3. It is easy for me to introduce or be introduced to people.	←	1.99	+	—
5	—	4. It is difficult for me to introduce or be introduced to people.	3.53		+	+
1	+	5. I find it easy to keep from being bossed by people.		3.80	+	+
2	—	6. I find it hard to keep from being bossed by people.	5.31		+	+
8	+	7. It is easy for me to continue with my work when it becomes difficult.		2.27	+	+
4	—	8. It is hard for me to continue with my work when it becomes difficult.	2.63		+	+
3	+	9. I give considerable thought to my future work or career.		2.22	+	+
11	—	10. I give little thought to my future work and career.	1.60		+	+
15	+	11. I rarely get upset when things go wrong.	1.86		—	—
16	—	12. I usually get upset when things go wrong.		1.47	—	—
28	+	13. If I don't get enough encouragement, I still go on with my work.		10.08	+	+
50	—	14. If I don't get enough encouragement, it is hard for me to go on with my work.	4.44		+	+
38	+	15. I do things that are good for me even if I do not like them.		2.83	+	+
43	—	16. I rarely do things that are good for me if I do not like them.	2.53		+	+
20	+	17. When I am in the wrong, I don't mind admitting it.		1.95	+	+
27	—	18. When I am in the wrong, it is hard for me to admit it.	3.69		+	+
40	+	19. I prefer to make my own plans to doing things that my friends propose.	5.90		—	—

---

* In an oral *Inquiry*, following the test administration, S. may reverse "decisions." This is indicated by *arrows* in reaction-time columns.

TABLE 1 (*continued*)

Random numbers		+ Self-Reliance — Lack of Self-Reliance	Reaction Time: Rejection	Reaction Time: Identification	Inquiry: Before + —	Inquiry: After
42	—	20. I prefer doing things that my friends propose to making my own plans.	4.39		+	+
21	+	21. I don't mind being alone with important people.	2.11		—	—
30	—	22. When alone with important people, I feel uncomfortable.		2.31	—	—
13	+	23. When things go wrong, I don't mind telling my feelings to others.	3.58	⟶	—	+
57	—	24. When things go wrong, I prefer to keep my feelings to myself.		2.11	—	—
36	+	25. When I am around people I do not know, I don't feel uneasy.	4.19		—	—
39	—	26. When I am around people I do not know, I usually feel uneasy.	⟵	3.34	—	+
37	+	27. When other people disagree with me, I don't get discouraged.	3.31	⟶	—	+
46	—	28. When other people disagree with me, I often get discouraged.	2.40		+	+
14	+	29. When I get hurt, I don't feel like crying or pitying myself.	4.70		—	—
52	—	30. When I get hurt, I feel like crying and pitying myself.	3.82	⟶	+	—
	Total after "Inquiry": —58.88 | +42.59	Total before "Inquiry"	64.26	37.21	17+ 13—	18+ 12—

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* In an oral *Inquiry*, following the test administration, S. may reverse "decisions." This is indicated by *arrows* in reaction-time columns.

Supposing the subject has indicated rejection of the above item. This would constitute one indicator of self-reliance. According to the cross-examination technique, this response cannot be taken for granted. It must be "cross-examined." For this purpose, some time later, randomly, and interrupted by unrelated distractor items, a counter-item is brought into view: "I don't mind going on with my work, even if I don't get enough encouragement." Again the subject shows his congeniality with, or rejection of, the "perceived" person.

If he is self-reliant in this situation, as was assumed from his previous response to the counter-item, he will indicate this now by pushing the "approving" button and thus identifying himself with the "self-reliant person" suggested in the card.

TABLE 2

	−	+		−	+		−	+		−	+
1		3.80	16		1.47	31	4.11		46	2.40	
2	5.31		17		3.94	32		2.59	47	4.22	
3		2.22	18	2.94		33		2.15	48	5.76	
4	2.63		19	3.53		34		2.68	49	7.70	
5	3.53		20		1.95	35		2.03	50	4.44	
6	4.27		21	2.11		36	4.19		51	2.81	
7		2.84	22		1.52	37	3.31		52	3.82	
8		2.27	23		2.13	38		2.83	53	1.87	
9		1.99	24	3.12		39		3.34	54		4.20
10		1.97	25	1.65		40	5.90		55		1.55
11	1.60		26	2.30		41	5.36		56	1.68	
12		2.44	27	3.69		42	4.39		57		2.11
13	3.58		28		10.08	43	2.53		58	1.96	
14	4.70		29	4.75		44		5.00	59	3.49	
15	1.86		30		2.31	45	5.86		60		2.88
	27.48	17.53		24.09	23,40		35.65	20.62		40.15	10.74

Totals

Left column	Right column
27.48	17.53
24.09	23.40
35.65	20.62
40.15	10.74
127.37	72.29

The tester enters each decision time in the Random List of Dimensions (Table 2): in the right column, opposite the number of the exposed card if the subject signalled approval; or in the left column, if he signalled disapproval.

5. *Interpretation*

For the purpose of interpretation, the polarities of choices and the respective decision-times are first transposed from the "Random List" (Table 2) to the "List by Categories" (Table 1). The tester can now see the system of diagnostic situations before him. Identifications and rejections of the subject are indicated by entering the corresponding reaction-times respectively in the right or left columns, opposite the respective statements (Table 1).

Time does not permit thorough discussion of a case of interpretation. Here are a few illustrations. As we can see from the total of the subject's "congenial" versus "uncongenial" decision-times on the "Random List" (Table 2), the subject allotted 72.29 seconds to perceiving congenial traits in another person, and 127.37 seconds to perceiving uncongenial traits. This supports the hypothesis that the perception of congenial traits is faster than the perception of rejected traits. The tabulation of decision-times, compiled from 30 tests, from which the test under discussion was selected, shows the consistent tendency of individuals to identify themselves *faster* with congenial statements, and *more slowly* with uncongenial statements.

Let us take a look at the "List of Categories," which in the present case is patterned on the dimensions of self-reliance (Table 1). A survey of the response material in terms of the principle of cross-examination indicates that the subject had 12 polar identifications out of a possible 15, which ratio shows a high degree of consistency, 8 polar responses being considered average.

The plus and minus signs on the left margin opposite each statement signify that the subject's identification with them would be an indication of self-reliance. The plus and minus signs on the right are the subject's actual choices. Thus, the tally between right and left results in the ratio between the "self-reliant" and the "un-self-reliant" indicators. This ratio was originally (that is, before the "inquiry," to be explained below) 17 plus items to 13 minus items.

More significant than these quantitative aspects of the test are, however, the possibilities of clinical interpretation.

In the present pattern of decision-times, there are six "regular" sets, that is, such as have a shorter decision-time for the perception of congenial statements, and a longer decision-time for the perception of uncongenial statements. Since these sets are normal expressions of self-reliance and offer no special problem, their discussion will here be omitted.

Irregular are, however, the following sets: 9-10; 13-14; 15-16; 21-22; 27-28—all showing a *reversed pattern of decision-times,* that is, longer decision-times in perceiving congenial situations; and shorter, in perceiving uncongenial situations. (Read entries as corrected by "inquiry.")

Irregular also are Sets 3-4; 19-20; 23-24; 25-26—all representing *patterns of non-polarity*. These patterns reflect indecision or ambivalence as to the identification with or rejection of the respective statements.

Other possible irregularities, in this case item 13, are conspicuously long decision-times, possibly pointing to some underlying unconscious complex, interfering with the perception of the stimulus item. This hypothesis forms, as you know, the foundation of C. G. Jung's Word Association Test.

Another irregularity, found in the present testee's responses, is *reversed polarity*. It means that, contrary to his predominant "self-reliant pattern of polarities," the subject identifies himself with one or the other "non-self-reliant" item (1-2; 11-12; 21-22; 29-30).

All irregularities of the indicated kinds are noted by the interpreter and taken up with the subject in an oral "inquiry." It consists partly in a re-administration of the test, but in changed random-order, and without recording decision-times.

After the inquiry, the corrected List by Categories (Table 1) revealed seven "regular" polar sets, that is, seven "cross-examined" indicators of self-reliance out of 15: Sets 5-6; 7-8; 9-10; 13-14; 15-16; 17-18; 27-28.

For the purpose of qualitative interpretation, all the responses were broken down into the following categories of self-reliance: in regard to other people; in relation to work and future; and with respect to frustrations met in life.

Self-reliance in regard to other people: Table 1, Sets 1-2, 5-6, and 19-20 combined, show that the subject is not self-reliant in an aggressive way; yet he will stand on his own when facing the danger of being bossed by others.

Sets 3-4, 21-22, and 25-26 indicate that the subject may be self-conscious and feel uneasy in meeting certain people; and that he may also feel uncomfortable when alone with important people. Set 23-24 would also seem to suggest that he would prefer to keep his feelings to himself when things go wrong. (Notice the shift on item 23, Table 1, during the "inquiry.")

Sets 17-18 and 27-28 show that she does not mind admitting it when she is in the wrong; and that she does not get discouraged when people disagree with her.

As to self-reliance in regard to work, the picture is much brighter. Sets 7-8, 13-14, and 15-16 show that she is a persistent worker, that she goes ahead, undeterred by difficulties; and that she is willing to do work that is good for her, but that she dislikes.

To be sure, this does not come easy to her, as can be seen from the long decision-time on Item 13—10.08 seconds, as compared to her average decision-time of 3.10 seconds on perceiving congenial personal manifestations in others. Set 9-10 signifies that she is eager to plan her future work and her career. During the inquiry she said: "I am most self-reliant in matters concerning my future."

Self-reliance when meeting frustrations: This aspect seems to be a definite liability in her self-reliance balance sheet. Sets 11-12 and 29-30 give evidence of this. She identifies herself with a person who gets upset when things go wrong. Not that this would deter her from carrying on her pursuits; but she admits that this upsets her. During the inquiry she also stated: "I am least self-reliant when it comes to situations involving a great amount of real frustrations." This suggests that she might at times indeed feel like crying and pitying herself when she gets seriously hurt. Her identification with Set 29-30 bears this out; it is not wholehearted, but is ambivalent.

6. *Evaluation*

In way of evaluation it is pointed out that the present test meets the requirements of a perceptual experiment as postulated by Postman (40, pp. 63/64): The subject responds only to a limited and simple feature of the stimulus, namely, whether he is or is not congenial with the stimulus item. In addition, he responds unconsciously by registering his reaction-time from being exposed to the stimulus to making his decision on congeniality or uncongeniality.

On the basis of the results of the described test, depth interviews as to the disclosed complexes of the testee can be prepared by the psychologist. The clinician, personnel officer, hiring executive, or other users, can then probe into these complexes in an interview with the subject.

The Automation Laboratory in Stamford, Connecticut, expects such a wide usage of the "prepared interview technique" in personnel management consulting work and clinical research that a simple decision-time apparatus, as described before, is being patented and manufactured.

E. THE TRAINING OF INTERPERSONAL PERCEPTION

The phenomenal fact of self-other matching, instigated by interpersonal perception, has been utilized for the development of a novel interpersonal diagnosis of personality. Self-other matching can, however, also be the vehicle of personality improvement. The discrimination between myself and "the other" can be predominantly objective or predominantly autistic. Greater objectivity in perceiving others can be achieved by rendering the self-other appraisal more realistic. This depends in turn on developing an inclination for problem-solving, rather than defending oneself against anxieties; for a problem-solving attitude makes for more realistic social perception.

To some extent, interpersonal perception is trainable. Some individuals tend to perceive more readily in others what they have in common with them, rather than in what they differ. Others are of the opposite type. Doubtless, the social educational emphasis could and should be shifted from perceiving difference to perceiving unity. The predominance of one or the other emphasis has a fateful bearing on inter-personal and interethnic relations. In neurotic percipients, a more realistic social perception will only be possible by having the subject gain insight into the unconscious reaches of his self-structure that interferes with objectivity in perceiving others.

Since interpersonal perception is contingent upon self-other matching, its trainability rests essentially on the formation of the percipient's self-structure. This development in turn can be enhanced by strengthening the self-contemplating and the self-activating acts within the total frame of the self-structure. The fulfillment of this requirement is, however, dependent upon the kind of society in which the individual lives. If this society gives him freedom to contemplate and to cultivate himself, he will develop a wholesome self. And if people have wholesome selves, their interpersonal perception will likewise be wholesome.

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ΔT FOR ELECTRICAL CUTANEOUS STIMULATION*

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A. INTRODUCTION

In a recent discussion of the use of the skin for communication purposes, Geldard (3) stated that "audition is more useful than vision as a means of making temporal discriminations" (p. 1583). Further, "the human integument . . . (rivals) the ear as a temporal discriminator and greatly (excels) the eye." The communication system described by Geldard utilized mechanical vibration of the skin, with duration of stimulation used as one of the primary cues to which meaning was assigned. The present writer, however, has suggested that electrical cutaneous stimulation might prove more advantageous for signaling purposes than mechanical vibration (7). No data are available, however, on discrimination of electrical cutaneous stimulation duration.

The Weber ratio for duration of mechanical cutaneous vibration was reported by Spector (14) to be about .40 to .50 at 0.1 sec., reducing to .09 to .10 at 1.85 sec. Relatively little change in $\Delta T/T$ was found to occur for standard durations in the range of 0.4 to 2.0 sec. These values appear to be of the same order of magnitude as those reported for auditory stimuli. Several investigations of auditory $\Delta T/T$ indicate that the Weber ratio may vary from .03 to .41 over a standard duration range of 0.016 to 30.0 sec. Maximum discriminability was found with standard durations of 0.375 to 1.5 sec., the smallest $\Delta T/T$ values reported varying from .03 to .10 in various studies (15). The range of standard durations wherein minimum $\Delta T/T$ was found is therefore comparable to Spector's data for cutaneous vibration.

Goodfellow (6) reported $\Delta T/T$ values resultant from a direct comparison of auditory, visual, and tactual stimuli. With a standard duration of 1.0 sec., the Weber ratio when using the Method of Limits was .06 for audition, .08 for touch, and .10 for vision. Similar results were reported for other psychophysical methods. These results tend to support Geldard's

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statement quoted earlier that Δ T/T for audition and touch are similar and that vision yields a larger Δ T/T than either.

Weber ratios for duration have been reported to be affected by other experimental conditions than the length of the standard. The most important of these is probably the intensity level used when determining Δ T/T. A systematic evaluation of the influence of intensity on discrimination of duration was reported by Henry (10), using auditory stimuli. Within a stimulus range of 47 to 277 msec., he found that discriminability varied directly with the length and the intensity of the standard. Smallest Δ T/T values resulted from use of high intensity levels (over a range of 20 to 80 db.) and also when using the longest duration of his study.

Henry interpreted his findings as support for the "integrated intensity" theory proposed by Holway and Hurvich (11). This viewpoint predicts a change in discriminability when either the intensity or duration of the stimulus is changed. More specifically, a larger Weber ratio is predicted when stimulus intensity is reduced, duration being held constant.

Data for auditory Δ I/I reported by Garner and Miller (2) indicate that intensity discrimination is a function of standard intensity and duration, with poorer discrimination resultant from use of weak intensities. Δ I/I for electrical cutaneous stimulation also is larger when using weak standard intensities (9). It has further been reported that anditory duration judgments are affected by intensity (13), and that subjective intensity is reduced when electrical cutaneous stimulus duration is shortened from, e.g., 1.0 to 0.1 sec. (8). Such data tend to support Holway and Hurvich's "integrated intensity" theory.

Presentation of the stimulus to the *O* may furnish additional cues if stimulus onset or offset proceeds at a rapid rate. Rapid switching on or off produces transients, which may affect duration discrimination. *O*s can discriminate onset-offset rate for mechanical cutaneous vibration and make absolute identifications of these rates (12). Further, estimates of onset-offset rate for electrical stimulation of the skin have been reported by Geldard (4). Direct estimates of onset rate and estimates of duration of stimulation yielded nearly identical results, power functions with an exponent of about 1.0. Nevertheless, it is not known whether or not discrimination of duration is affected by stimulus onset rate.

The present experiment investigated Δ T/T for electrical stimulation of the skin, at several standard intensity levels used in a previous study of Δ I/I for electrical cutaneous stimulation (9). The range of standard durations selected was comparable to that used by Spector (14) to determine $\Delta T/T$ for mechanical cutaneous vibration, but restricted to avoid discrimination based on intensity changes as duration is changed (10). Inasmuch as onset (or offset) time may affect $\Delta T/T$, one part of the present study utilized stimuli equated for the amount of time devoted to increasing (or decreasing) the applied current from the *RL* to the various peak intensity levels. A second part of the experiment utilized stimuli equated for the amount of current increase per unit of time from the *RL* to the peak intensities. Thus, onset-offset *time* was equated in Condition A; *rate* of onset or offset was equated in Condition B.

B. EXPERIMENTAL

The apparatus was the same as that of a previous report (7). Three Hunter Model 111-C timers permitted presentation of the stimulus for a given duration, and a second stimulus of the same or different duration after a specified interval of time. Transientless onset and offset of the stimuli at varying rates were permitted by the Grason-Stadler Model 829S76 electronic switch. *O*'s electrodes were 12 mm. diameter (pad of the index finger) and 25 mm. diameter (heel of the palm), both coated with electrode paste.

Two highly trained *O*s were used in this study (*cf.* 2), both of whom had participated in previous experiments involving electrical stimulation of the skin. The Method of Limits was used with 3 standard stimulus durations, 0.5, 1.0, and 1.5 sec. The interval of time between Stimulus 1 and 2 of a pair presented for judgment was 1 sec. (14).

Each *O*'s *RL* current value was determined at the beginning of the session. Three stimulus intensity levels were used, 120 per cent (Intensity 1), 160 per cent (Intensity 2), and 200 per cent (Intensity 3) of the *RL* current value. None of the stimuli elicited pain sensations. Sine-wave alternating current was presented at a frequency of 100 cps.

Stimulus onset (or offset) may be considered as a combination of both onset rate and onset time. In Condition A, the amount of stimulus time devoted to increasing current from the *RL* value to any of the three peak intensity levels was 25 msec. In Condition B, the rate of current increase from the *RL* value to the peak intensities was 1 per cent of the *RL* current value each .4165 msec.

A counterbalanced order was used for presentation of ascending vs. descending series and for standard stimulus first vs. variable first. Only one combination of experimental variables (intensity, duration and onset condition) was presented in a given session, in a different random order for each *O*, for a total of three sessions/combination/*O*. Sessions tended to be about one hour in length.

C. RESULTS

Mean Δ T/T values for each intensity level and onset-offset condition are plotted in Figure 1 as a function of duration. Maximal discriminability was found with use of Intensity 3 (200 per cent of the *RL* current value), and at the 1.5 sec. standard duration. No consistent change in the size of Δ T/T resulted from the use of different onset-offset conditions (Cond. A and B).

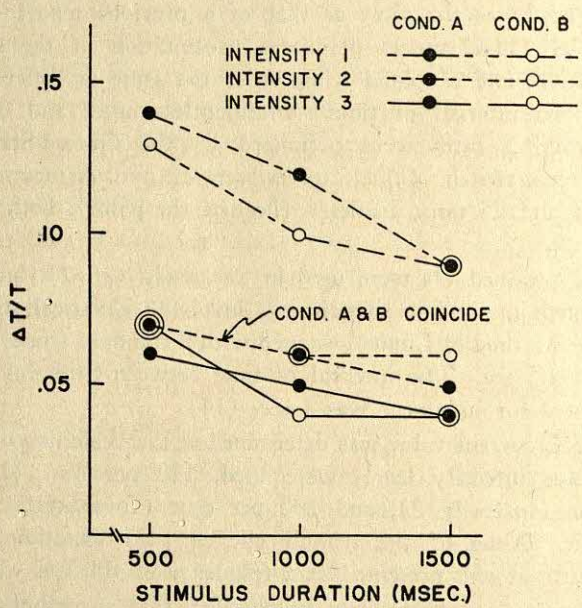

FIGURE 1
DURATION DISCRIMINATION AS A FUNCTION OF STIMULUS DURATION WITH THREE INTENSITY LEVELS AND TWO ONSET-OFFSET CONDITIONS

An analysis of variance was made of the Cond. A values of Δ T/T; results are shown in Table 1. Duration and intensity level of the standard significantly affected the Weber ratio; no other significant effects were found. Critical ratio tests indicated that Δ T/T was significantly larger ($t = 2.38$, $p < .05$) with use of the shortest standard duration, and that no significant difference resulted from use of the 1.0 sec. standard vs. 1.5 sec. Further, $\Delta T/T$ was largest when using the 120 per cent of *RL* current intensity level ($t = 7.14$, $p < .01$), but no significant difference was found between use of Intensity 2 vs. Intensity 3.

TABLE 1
ANALYSIS OF VARIANCE—DATA FOR ONSET-OFFSET CONDITION A

Source of variation	Error term	df	Mean square	F	P
1. Between durations	8	2	.00150	7.14	$< .05$
2. Between intensities	8	2	.00790	37.62	$< .01$
3. Between subjects	8	1	.00010		
4. D × I	7	4	.00012		
5. S × D	7	2	.00010		
6. S × I	7	2	.00020		
7. S × D × I		4	.00027		
Pooled interactions 8 (5 + 6 + 7)		8	.00021		

Results of an analysis of variance of the Cond. B $\Delta T/T$ values are presented in Table 2. Duration and intensity level of the standard significantly influenced the Weber ratio. As with the Cond. A values, $\Delta T/T$ was largest with use of Intensity 1 ($t = 7.94$, $p < .01$) and the shortest standard duration ($t = 3.17$, $p < .05$). Comparison of Table 1 and 2 indicates that Cond. A and B yielded nearly identical results.

TABLE 2
ANALYSIS OF VARIANCE—DATA FOR ONSET-OFFSET CONDITION B

Source of variation	Error term	df	Mean square	F	P
1. Between durations	8	2	.00120	10.00	$< .01$
2. Between intensities	8	2	.00605	50.42	$< .01$
3. Between subjects	8	1	.00010		
4. D × I	7	4	.00012		
5. S × D	7	2	.00030		
6. S × I	7	2	.00005		
7. S × D × I		4	.00007		
Pooled interactions 8 (5 + 6 + 7)		8	.00012		

Mean values for the PSE and the indifference interval with Cond. A and B are listed in Table 3. These values indicate that there were no constant errors consistent for a particular standard duration, intensity level, onset-offset condition, or individual *O*. The upper and lower *DL*s were not notably different. Further, the indifference intervals indicate that maximum discriminability of duration typically was found with the 1.0 or the 1.5 sec. standard durations.

TABLE 3
MEAN PSE VALUES AND THE INDIFFERENCE INTERVALS FOR EACH *O* UNDER ONSET-OFFSET CONDITIONS A AND B

		Duration of standard						Indifference interval	
		0.5 Sec.		1.0 Sec.		1.5 Sec.			
		A	B	A	B	A	B	A	B
O: GH	Intensity 1 (120% of *RL*)	488	516	985	1020	1503	1500	1040	1500
	Intensity 2 (160% of *RL*)	507	509	980	1004	1503	1498	1245	1450
	Intensity 3 (200% of *RL*)	496	503	1001	992	1487	1495	1150	850
O: JW	Intensity 1	503	505	1013	1010	1480	1515	1390	—
	Intensity 2	491	508	982	1003	1514	1518	1080	—
	Intensity 3	503	513	999	1005	1505	1501	—	—

No difference was found for the $\Delta T/T$ values determined by use of ascending vs. descending series, or by use of the standard stimulus as the first member of the pair vs. the variable stimulus first. In addition, no practice effects were found; with a particular set of experimental conditions, inter-session $\Delta T/T$ values were highly consistent.

D. DISCUSSION

The most notable of the conditions affecting $\Delta T/T$ in the present study was the intensity level of the standard. Temporal discrimination is impaired by a reduction in the stimulus intensity for electrical stimulation of the skin, and for other kinds of stimuli such as auditory (10). Apparently, however, a further increase in the standard intensity beyond some optimal value does not improve discrimination inasmuch as $\Delta T/T$ was not significantly different for the medium vs. the strong intensity levels used herein.

The duration of the standard also significantly affected $\Delta T/T$, but no significant improvement occurred when the standard was lengthened from 1.0 to 1.5 sec. The loss of discriminability when either intensity or standard duration is decreased below an optimal value is consistent with the view of Holway and Hurvich (11). Their "integrated intensity" theory predicts the above results. It may be inferred then, that some optimal number and rate of neural impulses facilitates discrimination. It is difficult to explain all sensory discrimination in such terms, however. Frequency discrimination is poorer for mechanical cutaneous vibration with a stimulus of 200 cps than with 25 cps (5), yet it would be expected that more impulses are initiated when using the 200 cps stimulus. It is possible, of course, that frequency discrimination is dependent upon a quite different process, for intensity discrimination of electrical cutaneous stimulation is not affected by stimulus frequency (9).

The Weber ratios determined in the present study appear to be somewhat smaller than those reported by Spector (14) for mechanical cutaneous vibration. It should be noted that the .40 to .50 $\Delta T/T$ values he reported for a 0.1 sec. standard duration were determined with a physical intensity level also used with standard durations of 0.5 sec. or longer. Auditory $\Delta T/T$ values are much larger with standard durations below 0.5 sec. (10), and the subjective intensity of electrical cutaneous stimuli is much reduced when using brief durations (8). Preliminary observations demonstrated, however, that *O*s cannot detect variations of subjective intensity within the range of stimulus durations used in the present investigation (0.5-1.5 sec.) when physical intensity is held constant.

The $\Delta T/T$ values of this study (.04-.07 with medium or strong intensity levels) are slightly less than the .08 determined for touch by Goodfellow (6). Part of this difference could be due to his use of unfilled intervals, whereas filled intervals were used in the present case. The present values are about the same as auditory ratios reported by Goodfellow (.06) and others (*cf.* 15), and less than comparable values for visual stimuli (.10) in his study.

Constant errors are not consistent in any given direction in this study. Further, inter-session variability was extremely small, and no practice effects were noted, although these have been troublesome in some studies (1). Variability, constant errors, and practice effects were perhaps reduced by the use of highly trained *O*s.

The $\Delta T/T$ values in this study were not affected by variations in time or rate of stimulus onset or offset. Although *O*s can discriminate, identify, and make estimates of stimulus onsets and offsets (4, 12), temporal discrimination seems unaffected by such variations.[1] Temporal perception, however, might be so affected if onset and offset comprised the major portion of the stimulus interval, only some 10 per cent or less of the stimulus duration being used for this purpose in the present investigation.

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[1] Miller has suggested that discrimination of stimulus decay for noise is based only upon the initial stages; the initial stages of decay were closely similar for all conditions in the present study. Miller, G. A. The perception of short bursts of noise. *J. Acous. Soc. Amer.*, 1948, **20**, 160-170.

The loss of intensive and temporal discriminability when stimulus intensity is reduced (9), the reduction in subjective intensity with a stimulus as brief as 0.1 sec. (8), and the poorer temporal discrimination with shortening of stimulus duration below 1.0 sec., may serve to partly explain performance with Geldard's mechanical vibration communication system (3). Primary cues used in his system were intensity, duration, and locus of stimulation; meaning (letters, numerals, and short words) were assigned to combinations of three intensities, three durations, and five loci. *O*s trained on that system made more errors based on intensity confusions than duration errors, and made very few errors of locus identification. The dependence of discriminability on both intensity and duration should be considered in the design of any communication system involving electrical stimulation of the skin.

E. SUMMARY

Differential discrimination of the duration of electrical cutaneous stimulation was investigated as a function of the intensity level and duration of the standard, as well as the possible effect of varying rate or time of stimulus onset or offset. With a standard duration range of 0.5 to 1.5 sec., $\Delta T/T$ was significantly affected by the standard duration and intensity level. No other effects were significant.

The findings are interpreted as supporting the "integrated intensity" theory of Holway and Hurvich. Poor discrimination results from use of weak stimulus intensities or very brief durations (0.5 sec. or less). It is concluded that use of electrical cutaneous stimuli for signaling purposes should consider the dependence of discrimination on both intensity and duration.

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THE FIVE-STEP INTERSUBJECT INTERVIEW TECHNIQUE IN PSYCHOLOGICAL RESEARCH*

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A. GENERAL PURPOSE

From various *theoretical* standpoints within psychology the importance of studying the individual's reaction to his total environment from *his* personal viewpoint has been stressed as against superimposing upon him extraneous and alien frameworks. In such contexts, terms like "phenomenal world," "life-space," "psychological field," or "personal constructs," have frequently been used. However, in *empirical* personality research, there have unfortunately been very few methods built up for the explicit purpose of mapping the content and attention centers of a subject's psychological field. This is apparently one of the reasons why some psychologists feel that various kinds of personal documents, such as letters and diaries, give a richer and truer picture of the subject's own world, his preferences and self-selected emphases, than most test-batteries can furnish. On the other hand, the disadvantages of personal documents—scarcity, non-representativeness, and low degree of comparability—are well known. Hence, among the many things to be desired in to-day's psychology we would like to list this item: more methods which try to combine the emphasis on the subject's self-selection of salient aspects in his personal world on the one hand with the availability and comparability of data gathered with conventional test methods on the other.

Besides studying the subjective world of a subject in relative isolation, it seems to be an important task to study what happens to his psychological field when he is confronted with another subject with similar or dissimilar life-space characteristics. A person's typical modes of reaction in this confrontation, and his typical modes of readjusting aspects of his life-space *after* such a confrontation, seem to carry a basic psychological interest.

While certainly not designed to fulfill *all* the methodological demands sketched here, the Five-Step Intersubject Interview Technique may be

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considered as one modest step towards these general aims—with special emphasis on methodological simplicity. Primarily, this technique is designed for studies of different life-space emphasis among various subjects as one important aspect of their individuality and for studies of various factors in the communication process.

B. General Description

The five steps referred to in the name of this technique may be described as follows:

1. In the first step, labelled *"Area Selection re Other,"* the subject is asked to imagine that he has met a person whom he does not know anything about, and that his task is to find out as many important things as possible about this person. The subject is requested to write down what he would ask the other person in such a situation. No specific details are mentioned; the subject should be free to display whatever aspects he would spontaneously focus upon.

2. In the second step, labelled *"Area Selection re Self,"* the subject is asked to describe what he would tell another person about himself in order to give quickly as correct and complete a picture as possible. In this case too, the subject is free to choose whatever he wants to emphasize.

3. After these two preparation phases, the *first interview phase* is introduced: the subject is confronted with another subject and instructed to get to know as much as possible about him within a brief, specified period of time.

4. In the fourth step, or the *second interview phase,* the roles are reversed; the former interviewer is now interviewed by the other person.

5. Finally, there is a brief *post-interview phase* where the subjects, now again separated, give their own subjective evaluation of certain aspects of the interview.

In general terms, then, the first two steps represent the subject's personal *prospective imagination,* including general plans and expectations for a two-person interaction with an unknown Alter. The two subsequent steps represent the real *interaction in situ* where the two subjective frameworks are confronted with one another; the most active role being given first to one, then to the other person. The fifth step, finally, represents the subject's personal *retrospective imagination,* including an evaluation of the interaction just finished.

C. General Analytic Framework

Although the collection of data is simple, being, in fact, primarily designed for children, a wealth of material is obtained, which means that many approaches to analysis are possible. The main data available are the records written by the subjects themselves; in addition, it is possible to use recordings and observers. For each pair of subjects, we obtain eight records: two from each of the three individual phases, and one from each of the two interaction phases in which the interviewer is writing down the information gained.

Some of the basic principles for analysis were initially formulated together with Dr. Doris Allen in a pilot study using a somewhat different technique with two steps only. The first task is usually to identify the information units of a record on the basis of a set of operational rules. The records are then studied for amount, content, sequence, information level, etc., of these units.

Of the many concepts which have been found useful in this analysis, three may be briefly mentioned: life-space emphasis, life-space contingencies, and life-space value-vehicles. The term *"Life-Space Emphasis"* refers to the selective attention on content areas, as indicated by frequency of occurrence of ideas within specified categories. The term *"Life-Space Contingencies"* refers to the selective combination of ideas, as indicated by heightened frequency in specific cells of a data matrix. Lastly, the term *"Life-Space Value-Vehicles,"* refers to objects spontaneously selected for positive or negative evaluation. One of the most interesting possibilities of analysis is obviously to study the sequential adaptation over time: for instance, to see to what extent ideas expressed in the individual phases are carried out in the two-person situations under various degrees of initial similarity. Among the many measures which may possibly be used in such a study we may mention an *index of interactive creativeness,* that is, the number of new ideas in the two-person phases which did not occur in any of the individual phases, and, on the other hand, an *index of interactive inefficiency,* giving the number of ideas in the individual pre-phases which are lost in the interaction.

D. Empirical Illustrations

So far, the method has been used in developmental studies on 150 Swedish children from age levels 9, 11, and 13, on small groups of university students, and on members of international camps. For the purpose of further methodological illustration only, I should like to quote a few typical findings on coder reliability, general productivity, and content of our child records.

1. *Coder Reliability*

Among our first concerns was whether or not the two main steps in the analysis—identifying of units and classifying for content—could be done with an adequate degree of coder consistency. The units were small logical content carriers, not equivalent to any specific linguistic form-unit, and the content was classified into a detailed 17 by 92 content matrix; the 17 rows representing person categories, and the 92 rows representing various categories of information concerning these persons. In a study of 510 text records, point by point consistency between two independent content coders was 94 per cent. Product-moment correlations for number of units identified varied from .97 to .99. We felt that this degree of coder consistency was very satisfactory for our purposes.

2. *Record Productivity*

Besides the individual variations, what may be said about more general determinants of record productivity? For one thing, the girls tended to have more information units than the boys both in preparation and interview phases. This sex difference was seen more clearly among older than among younger children; it was also more clearly displayed in the self-directed pre-phase than in the other-directed pre-phase; the productivity of the girls being greater than that of the boys most typically when talking about their own person. (Quoting a few P-values as estimated by chi-squares: sex differences in the interview phases gave a value below .02 among 13-year-olds, while there was no significant difference among 9-year-olds; and whereas differences in the self-directed preparation phase gave a P-value below .001, in the other-directed phase we obtained a value between .10 and .05 only.)

From comparisons with other variables, we may note, for instance, a clear relationship between record productivity and the subject's impulsivity as measured by a grapho-motor personality test (Dombrose & Slobin: Arrow-Dot Test); the more impulsive person having significantly more productive pre-phases, apparently needing shorter warming-up periods (P-values for the two pre-phases below .01 and .05 respectively).

One of the most surprising findings on record productivity was perhaps the considerable communication efficiency shown in interviews between 11-year-old children without a common language. The number of information units per 20-minute interviews averaged 18.4 among such children ($N = 30$; data from two international children's camps in 1960). From earlier studies in children's international camps it has been clear that attitudes and feelings can easily be transmitted across language barriers, and deep friendships develop. It now seems evident, in addition, that at this young and spontaneous age, the absence of a common language does not act as a too severe handicap even for the transmission of factual information. Gestures and drawings can apparently be quickly substituted and efficiently utilized.

3. *Content Trends*

As for content, the individual variations are often the most interesting fact, but these variations should of course be considered against the more general trends. Studying the content distribution for the references to different *person categories,* we find, in general, comparatively frequent references to the subject's immediate family—mother, father, brothers and sisters—but a comparatively low number of references to persons outside the family—friends, classmates, teachers, and other persons—(11.5 per cent v. 6.6 per cent). Especially when one considers the much greater potential choice area outside the family, this is a striking fact; even in a child-to-child communication, the activated life-space is apparently quite family-centered.

Studying the content distribution for *characteristics* of the persons mentioned, we find, for example, that a considerable proportion—about a third of the units—refer to what we have called "passport information" (name, age, occupation, size, eyes, etc.), and that ownership relations are also often mentioned ("I have a red bike"; "he has a watch with a second-hand"; "they have TV," etc.). However, the emphasis varies with age. The passport information and references to ownership *de*crease with age, and instead references to personal relations and internal reactions *in*crease. ("Passport information": 9-year: 39.6 per cent; 13-year: 27.5 per cent; "ownership": 9-year: 11.5 per cent; 13-year: 3.8 per cent;—"personal relations": 9-year: 3.4 per cent; 13-year: 7.9 per cent; "internal reactions": 9-year: 2.6 per cent; 13-year: 6.3 per cent). On the basis of these and similar data it does not seem unreasonable to speak of an increasing "internalization" of the life-space with increasing age of our children. This is, of course, nothing surprising; on the contrary, it is in good agreement with most developmental theories. From our methodological point of view this is one indication among others that the operational indices derived from the present technique seem to tap psychologically important aspects of behavioral development.

Among the many more *specific characteristics* of content to be noted we we may mention the emphasis on numerical specification ("She has been 6 times at the dentist"; "they have 16 lamps at home"; "she goes to bed at

7:30," etc.). This typical concrete specificity is found in over 20 per cent of the units among our 9- and 11-year-olds. At an older age, however, there is a significant decrease ($P < .001$, when comparing the interview phases of 9- and 13-year-olds by chi-squares).

E. FINAL REMARK

To these brief empirical illustrations, let me add a final remark. From casual observation in group cleavage situations it would seem likely that these game-type interviews could also be profitably used in action research on attitude change, as one tool in attempts to make the social perception of members belonging to special groups more objective (e.g., different racial and religious "outgroups"). But this is a hint for research more than a clear result. What is clear, however, is this: first, that the present technique is easily accepted by most young subjects and is often greatly enjoyed; second, that a variety of differentiating information can be derived; and third, that a detailed analysis of units and content can be made with a high degree of coder consistency. These three points, in addition to the basic theoretical considerations mentioned, make us feel that further explorations with this simple technique for various uses within the borderline area between small-group study and personality research would seem well worth the trouble.

F. ABSTRACT

A method is presented which seems useful for investigation of a series of problems within the borderline area between small-group studies and personality research. It is especially designed for studies of the communication process (for instance, factors influencing "communication efficiency" and "communication approach") and for studies of different "life-space emphasis" among various subjects as one important aspect of their individuality.

The data collection focuses upon mutual interviews on different "levels of reality": "real interaction" (non-guided peer interviews with role reversals) is both preceded by and followed by "imagined interaction." The data analysis includes, e.g., identification of information units, classifications of these units on content matrices, and interpretation of such matrices in terms of "life-space contingencies." Brief illustrations from empirical studies are given, including developmental data from the 9, 11, and 13 year levels, and data on communication between children without a common language.

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SELECTING AND CONNECTING*

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This is only an account of a simple experiment to see if contiguity of a situation and response, without any conceivable reward, would result in learning. But it is so much a part of two other experimental attempts to understand S-R selecting and connecting that we shall describe them too.

S-R selecting and connecting refer, of course, to conjectural things that are responsible for occurrence of movement or action, and to presumably different things that are responsible for recurrence of it. An early attempt to explain these processes, occurrence and recurrence of action, involved a derivative of one of man's most long-lived myths—the myth of the dryad. You may remember the dryad was first thought of as a tree nymph, a protecting spirit, born with the tree, living in or near it, and watching over its growth, its budding, its flowering, its fruit bearing, and its leaf shedding. The dryad was simply the *name* given the *life* of the tree, and, as often happens, the unknown now being named was more than half explained. So the vital force soon came to be a familiar concept.

As the ancients had difficulty in separating the living from the non-living without an animating personality for the former, there was naturally very widespread extrapolation of the vitalistic notion to cover all things that changed or moved. For two thousand years after man's actions were subsumed under the dryad myth, much of what was called psychology was speculation as to how this mentalism worked.

It was at the turn of the Nineteenth Century that Itard, Member of the Academy of Medicine in France, came to try out a differently based method for controlling the activities of the Wild Boy of Aveyron. He attempted to control the savage by the systematic use of reward. Needs, both physical and social, were created and then were removed or reduced with an appropriate reward when the desired act occurred. Thus after the boy said *lait,* he was given milk, or after he located the lure in a delayed reaction set-up, he was allowed to eat it. Another interesting technique, and one that you

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[1] Address of the President of the Southeastern Psychological Association, meeting in Atlanta in 1956.

will recognize as current, was used in connection with a card discrimination problem that Itard was trying to teach the boy. Itard, by accident, discovered that the boy was acrophobic. This intelligence was put to use in a manner suggestive of the contemporary Mowrer-Miller fear conditioning technique. As Itard put it: "I violently threw back the window of his room which was situated on the fourth floor and which opened perpendicularly on to a big stone court. I drew him near with every appearance of anger and, seizing him forcefully by the haunches, held him out of the window. After some seconds, I drew him in again. He was pale, covered with a cold sweat, and trembled a little, which I took to be the effect of fear. I led him to the cards." "This strange method succeeded, if not completely, at least sufficiently." This objective work of Itard's was a body blow at the dryad, but she died hard.

It was nearly a century later that Thorndike (1898) made his famous studies of problem solving in cats, dogs, chickens, fish, and monkeys, and out of which formulated his Law of Effect that was to be so influential in psychology and education for at least until now. Thorndike's emphasis in these experiments was that reward produced in the animal a "state-of-affairs" that strengthened the connections between the situation and the response that was rewarded. He described the conjectured "state-of-affairs" operationally as "one which the animal does nothing to avoid, often doing such things as attain and preserve it." That is, the thing to be learned, the pulling of a string, the lifting of a latch, or the licking of a side, could be separably observed from the doing nothing to avoid a reward, or from the eating of it. Thus the latter, which was the measure of the satisfying "state-of-affairs," could be related to the former.[2]

Thorndike's Law of Effect has proved to be very useful for those interested in how to use a reward to get a habit established. Furthermore, it has led to hundreds of functionalistic studies of various features of reward. Its contribution to the problem of how rewards work, however, has been less readily identifiable. This may be due in part to the mentalistic interpretation given the Law by many of Thorndike's followers as well as by many of his critics. At any rate, it was some 20 years after his pioneer studies before experimental attack was directed specifically toward understanding reward itself. It was also some 20 years before he changed his view that punishment shared with reward the responsibility for controlling habit formation. This left for him only reward to shoulder the burden of learning, except for belongingness that he then introduced.

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[2] One wonders how this objectivity of the Law of Effect would work though, if the interest of the experimenter were in the acquisition of the responses that make up the doing nothing to avoid, or in the doing of such things as attain the reward.

We said that the dryad died hard. She didn't really die—she was just rechristened. In the cognitive theories of Tolman, Lewin, and the classical Gestalters, reward is given an informative function. It tells the organism how he's doing. In the stimulus-response theory of Guthrie it is given direct significance. In the stimulus-response theories of Hull and Skinner, it is assigned a major role. The manner in which reward is thought to exert its effect on selecting and connecting is a distinguishing feature among the most strongly favored learning theories.

How may reward work to increase probability of occurrence of a response? Mary Kittrell and I, impressed adiently with both the Darwinian notion of biological adaptiveness of behavior and the Hullian drive-reduction hypothesis, and abiently with the Thorndikian "state-of-affairs," tested a simple deduction as to how one aspect of reward might work. The deduction was that rewards of strikingly different intake indexes would have strikingly different effects upon learning. Specifically, the experimental question was—Will a response followed by a highly preferred reward, i.e., a food high on a rate-of-consumption scale, become connected any more quickly or strongly with stimuli that may occasion it than will one followed by a seldomly selected food of equal nutritive adequacy? Young (1944), Simmons (1924), and Elliott (1928), had previously investigated this problem but nutritional adequacy of diets, amount of reward, amount of eating activity, consistency of reward, and moisture content were not among the controlled variables.

In our study the preference rank of each of three standard laboratory diets was determined for each of 44 rats. The master diet on which the rats were raised from weaning time was composed of equal parts of three diets—McCollum Diet, Purina Meal, and Rabbit Pellets—all ground together. Preferential ranks for these diets were determined when the rats were between 54 and 68 days of age. The tests for this extended over a period of 10 days, during which time the quantity of a rat's regular diet was reduced. In addition, all food was withheld from a rat for 12 hours prior to each test. The tests, which lasted for 30 minutes each, were made in cages wherein were equal quantities of the three diets in separate dishes. Position of the dishes in the selection cages was always changed from day to day. Amount of each diet consumed was determined by subtraction of final from initial weight.

After completion of the preference testing, calculation was made of the average consumption per diet per rat. The diet consumed in the largest quantity was designated as most preferred and vice versa. Tremendous differences in amount existed for the most preferred and least preferred for each rat.

Two learning situations, a single T-Maze and a multiple Y Warner-Warden Maze, were used to test the reinforcing value of the two foods. With the T-Maze, five trials were given per rat per day for 10 days. For half the rats, each received at the end of a correct trial ½ gram of his most preferred food. For the other half, the reward was ½ gram of least preferred food. In other words, one half the rats were given an opportunity to learn a choice between an alley that led to nothing and one that led to a most preferred food. The other half had a choice between a blind alley and an alley leading to a least preferred food.

T-test values for statistical interpretation of differences in both running speed and in errors were determined for the two sub-groups. The values were respectively only 1/5 and 1/7 the size required for a difference at a 5 per cent level of confidence. That is, a hypothesis of homogeneity of effect was tenable.

Results obtained with the multiple unit Y-Maze were so similar for the two differently rewarded groups that no statistical apparatus was needed to show that our deduction was not supported.

The finding that rewards possessing very different preference values were indistinguishable in their effects on learning created a noticeable weakening of our confidence in the adequacy of reinforcement theory. Nor was this uneasiness diminished by a re-examination of the theory as stated by its propounders. Thorndike's post-1933 view was undisturbed by our results, but this would have been the case if the finding had been different. He attributes the selecting function of reward to some "overhead control" in the nervous system thusly, "if what the overhead control wants is—a food, a freedom, a companionship,—then the connection will be formed." This amounts to a statement of a relationship between a situation, a response, and a reward that follows the response. That is, it is a description of the fact that if a reward works, it works.

Hull's position on the mechanics of reinforcement, prior to the late 1940's, was that it acted through reducing a drive state. In so doing it was thought to trigger some unspecified mechanism that associates responses with contiguous stimuli. This drive-reduction view was later augmented in the light of secondary reward effects by drive stimulus reduction. So finally for Hull (1949) the sequence of events required for S-R connecting was (*a*) a condition that creates a drive, (*b*) an increase in varied behavior caused by that drive or its stimuli, and (*c*) a response that provides a decrease in the drive or its stimuli. Accordingly, it is not disturbing to find that one food is as effective as another in producing maze learning in a well-nourished animal that is merely hungry. But the problem of accounting for the rat's behavior in the food-preference tests remains. The learning that occurred in the selection cage in connection with the preference determination would seem to be as fundamental as that that occurred in the mazes, and just as much in need of explanation. That learning did occur in the preference-testing situation was indicated by the subjects' daily location of a dish containing a particular diet that soon became its meal. A drive-stimulus-reduction theory of reinforcement cannot be used to account for uniform effects of different rewards in one situation and for different effects in another situation. Differences may produce differences but sameness cannot.

According to Young (1955), the dean of food-preference experimentation, thirsty rats do not learn to make the same kinds of water discrimination that non-thirsty rats do. Nor, says he, do hungry rats discriminate between food the way they do when not hungry. Thus he would seem to be implying two mechanisms for the effect of reward on learning—one with drive and one without. But our rats were hungry when the food preferences were determined and also when the rewards were tested in the mazes. This half-way contradiction was not the answer sought.

Mowrer's pre-1954 two-kinds-of-learning theory would account for the maze learning but would not, at least on the surface, seem to furnish any understanding of the food preferences. But Mowrer (1956) has discarded his two-kinds-of-learning theory in favor of a sign-learning theory that involves two factors both of which depend upon feedback. The factor pertinent here is that if stimuli are associated with a response that has been followed by a reward, then, when those stimuli occur again they arouse "hope" in the organism that a reward will be forthcoming and hence lead to the response with which they were already associated. Some different way of saying this would appear to be necessary before it can be a reinforcement for acceptance.

Miller (1951) has a most attractive theory of reinforcement that invokes only one operation—a reduction in strong stimulation—as the basic mechanism whereby reward leads to learning. Furthermore, it makes no difference whether the strong stimulation is a part of primary or learned drive or whether its reduction is direct or indirect. If we apply this theory to our food preference testing it would state that the rats selected and ate most consistently of the foods they selected because of the amount of stimulus reduction produced in so doing. Also the foods so selected should have produced the fastest maze learning. But they did not.

To go further, though, into this question of how reward might exert its effect, we conducted another experiment along the same continuum as the one just described. Specifically, we sought to determine whether a food without nourishment would serve as a reward, and if so, for how long a time. This time factor was introduced in connection with presumed secondary or conditioned reward effects that the substance might have. The non-nutritive reward was a substance bearing the trade name "Celluration." Celluration is prepared from rice hulls by a series of chemical processes that remove all non-cellulous ingredients except less than 1 per cent siliceous ash. It contains no proteins, no fats, and its vitamins have been removed or destroyed. Its form is that of a light brown fluffy meal. Preliminary work in search of subjects that would eat "Celluration" revealed that chickens met the requirements. Furthermore, personal communication from the scientists of the company that prepares "Celluration" assured us that for chickens it was entirely non-nutritious.

For the learning situation an apparatus was used that has previously proven learnable by chickens with ordinary food as reward. It was a single unit T-maze with 12-foot stem and 3-foot arms containing offsets at the ends for reward containers. These could not be seen until they were reached. To determine the effectiveness of the reward, count was made of the number of trials to meet a criterion of 10 errorless choices in a row. Next, the "Celluration" was placed in the other arm of the maze and a reversal of habit was required for its attainment.

That "Celluration" acted as a reinforcing agent for learning was indubitably demonstrated in the case of three chickens—the only ones used for that purpose. The scores for the original problem, and for the successive reversals, are here given to show that there was no indication of extinction of effect of the substance over the considerable period that it was used. Subject 1 required 35 trials to meet the learning criterion. For the three reversals of direction of reward that followed, the trials required were 19, 23, and 10. Subject 2 required 9 trials to reach the criterion. For its reversals the figures were 7, 20, 11, 23, 3, 4, 8, and 3. The third subject required 19 trials to locate consistently the "Celluration." It mastered its only reversal in five trials.

The learning of these subjects was spread over 10, 17, and 5 days respectively. For these periods no access to genuine food was allowed. The reason for these extreme deprivations was to provide opportunity for extinction of possible secondary reward value; eating of the "Celluration" could have been due to conditioning that occurred in ordinary eating. But there was no diminution on learning or in speed of running even for the subject that was not fed for 17 days.[3]

This study differs in intensity of drive and in secondary reward implications but not in principle from studies by Sheffield and Roby (1950), Sheffield, Roby, and Campbell (1954), and Sheffield, Wulff, and Backer (1951) that revealed habit formation without need-reduction. They produced learning by the use of saccharin in two cases and by allowing preparatory but not consummatory sex behavior in another. Their results and ours, both unexplainable on a drive-reduction theory of reinforcement, pushed our experimentation in the direction of the Guthrian view of the nature of reinforcement.

Guthrie, in his latest writing on the subject in *Contemporary Psychology* (Vol. 1, No. 1, p. 10) states "What is being noticed becomes a signal for doing what is being done." He goes on to point out that the data language of the statement is ambiguous. That is, he is not sure how one can observe on the one hand what is being noticed and on the other hand what is being done. But if the theory is to be tested these things must be identified. In the final study to be reported we believe that has been done.

In question form, the subject of the investigation was, "Will an organism repeat a response if a stimulus to which he was making the response is re-presented if no conceivable reward followed the prior occurrence?" The beauty of Guthrie's theory has always been somewhat dimmed by lack of a clearcut demonstration of its operation. That lack has now been supplied by use of a Lashley type exposure apparatus, a dark room, and some rats. With this apparatus, which consists of a vertical screen with two card-covered openings some 20 inches from a jumping platform, it is possible to ascertain what is being noticed and at the same time to know what is being done. It should be remembered that Guthrie insists on the potency of a stimulus to evoke the reaction that was *last made* in its presence. Now the last response a rat could make to a stimulus card toward which it was jumping would be the jumping response if the card could be instantaneously removed while the rat was in the air. That task was accomplished by having the top of the jumping platform arranged to actuate a circuit-opening relay the instant the rat left it. Thus the mercury-lighted room was in sudden darkness before the rat landed on the stimulus card that covered the opening in the screen toward which it was jumping.

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[3] An incidental observation made in connection with these studies that might be of interest to students of motivation was that when the period of deprivation ended for the male chicken of the group, his first object of attention when returned to the flock was not food.

Results. Some questions can be answered with only one case or observation as data. That is the situation here. With no motivation in the form of shock, or hunger, or air blast, or tail whipping to instigate jumping toward a white or toward a black-and-white-splotched card, only *one* rat out of 10 jumped. His learning was phenomenal! Fifteen jumps out of a possible 17 were made to the same card regardless of the hole it covered. This is faster learning than we have ever obtained on the Lashley apparatus with the usual escape motivation or food reward. But we were more impressed by our technique that yielded so little data. To obtain a larger percentage of subject performance, two modifications in technique were introduced. One was to replace the gap between jumping stand and screen with a narrow V path originating on the stand. The other was to substitute for the darkness an electro-convulsive shock. That is, the card was made invisible as soon as the rat moved toward it not by darkening the room but by "blacking out" the rat with a convulsion.

Electro-convulsive shock has been an independent variable in extensive investigations in animal motivation and learning. No study though, so far as we could find, had looked for the subsequent effect it might have on the act the rat was engaged in when shocked. Since the convulsion begins with tonic rigidity the very instant the current is applied, our thought was that such should preserve the connection between the card and the approach response; hence the decision to try it out.

Twenty-two rats were divided into two groups and given two trials per day for five days on the discrimination apparatus. Padded alligator clips attached to very light wire were placed on the ears of all subjects. For one group an electro-convulsive shock was administered the instant the rats left the platform toward a stimulus card. The rat, when shocked, was in series with some 34,000 ohms as he drew a current of between 35 and 50 milliamperes for 2/10 of a second. The pair of shocks on any day was one hour apart.

The subjects in the control group were allowed to select a pathway toward a stimulus card, just as had the experimental subjects. But instead of receiving a shock, they had the ear clips removed. This no doubt reduced some ear stimulation and, according to a stimulus-reduction theory of reinforcement, should have caused learning. This was done intentionally so that if the experimental group per chance should show more repetitive behavior than the controls, then, there would be all the more evidence of unrewarded learning.

The stimulus cards—white, and black-and-white-splotch—were at the distant ends of the V pathways—12 inches from the bifurcation point. They were alternated in a random manner. The rats in the experimental group received a convulsive shock no matter which stimulus card they approached. In like manner, the control rats had the ear clips removed regardless of path taken. Thus, the measure of the effect of the treatment was whether a rat did what he had done an hour before in the same situation.

On the very first day, 10 of the 11 blacked-out subjects repeated on the second or test trial what they had done on the first trial. Of the 10, four selected the splotch card while the rest chose the white. Only four of the 11 control subjects showed repetitive selections.

The *probability* of 10 of 11 rats selecting of a pair of cards the same one selected an hour earlier when it was in a different position *is less likely* than a person's calling 10 correct out of 11 tosses of a coin in a chance situation. To the rat's card-choice possibilities should be added those of sitting on the platform and jumping into space. Thus, there is reason to call their behavior repetitive.

Although there was, for a few subjects, methodological irregularity in continuing the experiment, it was done for four more days and eight more shocks. On one occasion, the third, the performance was identical with the first test; otherwise both performance and appearance of the experimental subjects showed a decline. On the other hand, the control subjects had just begun to learn as the experiment ended.

We began these studies in the belief that the data would have bearing upon the question, "How may a reward operate to effect selecting and connecting?" We have ended up believing that reinforcement in the form of biological adaptation cannot be accepted with the complacency it created so extensively for the past 15 years. This statement might well have been paraphrased from the concluding chapter in Hilgard's revision of his *Theories of Learning* that was released by the publisher last month. Hilgard went on to say, as we shall not, that attention is therefore indicated in the direction of cognitions, information, insight, ideas, hope, belongingness, and the like. He said further, however, that it would be erroneous to regard this view as a sign of a return to pre-experimental psychology; that is, a return to an acceptance of mentalistic and mystical concepts rather than objective behavioral ones.

For our part, and for what it is worth, the controllability of behavior effected by a non-nutritive diet in chickens that were wasting away, and the discriminations effected by light-out, and more especially by "black-out," in rats that were not doing well, incline us to think that it is not yet time to ask the advocates of the dryad if we may join them.

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COMPARISON OF THE RESULTS OF A LOGICAL QUESTIONNAIRE WITH READING COMPREHENSION, VERBAL ABILITY, AND GRADE POINT AVERAGES*

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The purpose of this paper is to present data having a direct bearing on the relationship of logical reasoning to reading comprehension, verbal ability, and grade point averages.

These results were derived as a part of a research project designed to show evidence whether certain validity patterns, or laws of logic, existed within the population (1). There were a total of 1390 university students involved in the entire project, and a total of 23 different test instruments. The students were Freshmen at Michigan State University and were taking courses in Natural Science.

The test instrument selected for this aspect of the research employed the predicative logic. All the predicative forms involved a predication on the part of the student, and thus, for all validity patterns everything was constant except the form. The particular validity patterns under analysis were Modus Ponens (MP), Modus Tollens (MT), and Syllogism (Syll).

The individual tested was presented with a series of statements in each test item and his task was to decide, in each case, whether the discourse was "reasonable" or "not reasonable." There were 15 items for each validity pattern, making a total of 45 items in the questionnaire. The scoring formula was Rights minus Wrongs to make allowances for guessing. The reliability formula was:

$$r = \left(\frac{n}{n-1}\right)\left[\frac{\sigma_x^2 - \left(\frac{\bar{x}}{n}\right)(n-\bar{x})}{\sigma_x^2}\right]$$

The reliability values for the test instrument are presented in Table 1. These values are strong enough to conclude that the test instrument was

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[1] This paper is based in part upon a doctoral disseration submitted by the author to the School for Advanced Graduate Studies at Michigan State University.

measuring what it was supposed to measure, namely, the prevalence of validity patterns within the population tested.

However, one of the most important ways to determine the value of a test instrument is in terms of its predictability. Thus, a logic test is not unlike a theory in that you prove its merit in terms of its confirmable consequences.

TABLE 1

RELIABILITY VALUES FOR THE TEST INSTRUMENT

Modus Ponens	.870
Modus Tollens	.821
Syllogism	.848

Specifically, if the test instrument provided in this study is as reliable as the values in Table 1 indicate, what implications does it hold for general reading comprehension, verbal ability, and the ability to achieve good grades in college? One would hypothesize that if this test has merit, then there should be a positive relationship between a person's ability to exhibit validity patterns and (*a*) his reading comprehension, (*b*) his verbal ability, and (*c*) his ability to achieve high grades in college. Moreover, the corollaries of these relationships should also be positive. That is, there should be positive relationships between low logic scores and low scores in each of these abilities. Therefore, our predictions were that these relationships would hold, and, in so doing, we would be providing outside checks for the value of the test instrument developed in this study.

The test was administered to a population of 131 students. From this were selected two groups, namely, those having high logic scores and those with low logic scores. Tests for significance were computed for each group for (*a*) Reading Comprehension (RC), (*b*) Verbal Ability (V), and (*c*) Grade Point Averages (GPA).

The source of the reading comprehension and verbal ability scores were from the Michigan State University entrance examinations that all students take when entering college. The tests involved were the MSU Reading Test (Reading Comprehension) and The College Qualification Test (Verbal Ability). The grade point averages were obtained from the grade records of students recorded at the Administration Building at Michigan State University.

Only those students with an average of 87 per cent or better on all three forms were selected for the "High Logic Group," while only those with an average of 33 per cent or less on all three forms were selected for the "Low Logic Group."

The fundamental question is this: do those people who do better on the logic test also do better on the RC and V tests, and get better grades, as compared with those students who get lower logic scores? If they do, then it can be said that there is a positive relationship between ability to exhibit validity patterns and reading comprehension, verbal ability, and grade point averages. If a person gets a high logic score, he will likely be high in these other factors. If he gets low logic scores, he will likely be low in these factors.

In the High Logic Group there was a total of 16 students. Two students were omitted from this group—one because he had no scores for the RC and V tests, and a second because there was no name on his answer sheet of the logic test.

In the Low Logic Group there was a total of 21 students. Two students were omitted from this group—one because he was a transfer student, and a second because he had no scores for the RC and V tests. The examiners of the RC and V tests state that the scores for transfer students "must be interpreted with caution." As a matter of fact, beginning with the entrance examinations for Fall Term, 1958, transfer students were not used in setting the norms of these tests.

The RC and V scores are derived scores and ranked from 1 to 10. This scale in interpreted to mean that a person with a score of 9, for example, ranks at a position such that 96 per cent of the Freshmen at MSU would have a lower score. Derived scores less than 9 would have corresponding lesser percentages.

TABLE 2

Comparison of Means of RC, V, and GPA Scores Achieved by High and Low Logic Groups

RC mean of High Logic Group	6.875
RC mean of Low Logic Group	4.714
V mean of High Logic Group	6.973
V mean of Low Logic Group	4.762
GPA mean of High Logic Group	2.745
GPA mean of Low Logic Group	1.888

Table 2 compares the means of the two logic groups relative to the RC, V, and GPA scores achieved by the students within these groups.

The data in Table 2 provide evidence that a positive relationship exists between ability to think logically and (*a*) ability for reading comprehension, (*b*) verbal ability, and (*c*) ability to achieve a grade point average around 2.75. In terms of the grading system employed at Michigan State University, this value is in the upper C grade range.

The corollary to this was also shown, namely, that there was a positive relationship between a lack of ability to think logically and (*a*) ability for reading comprehension, (*b*) verbal ability, and (*c*) the attainment of a grade point average around 1.89. This last value is in the upper D grade range.

To determine whether the differences between the mean values given in Table 2 were meaningful, tests for significance were calculated and the results are given in Table 3.

TABLE 3
VALUES FOR SIGNIFICANCE BETWEEN THE MEANS OF RC, V, AND GPA SCORES ACHIEVED BY HIGH AND LOW LOGIC GROUPS

Significance value for RC means	4.493	Significant
Significance value for V means	4.013	Significant
Significance value for GPA means	4.869	Significant

CONÇLUSIONS

By determining the significance between the means of RC, V, and GPA scores achieved by the High and Low Logic Groups (Table 3) evidence is provided for establishing a positive relationship between ability to think logically and (*a*) ability for reading comprehension, (*b*) verbal ability, and (*c*) grade point averages.

Thus, the predictions that were upon the basis of the test instrument were confirmed, and in so doing, provided outside checks for establishing the merit of the instrument per se. Because if these comparisons had turned out otherwise, specifically, if the differences between the means had turned out to be not significant, then little could be said for the discriminatory ability of the test instrument by failing to show a significant difference in the means of high and low logic groups for RC, V, and GPA scores, as well as failing to establish a positive comparison of the results of the instrument with the results of other long established tests.

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INFORMATION TRANSMITTED VIA ELECTRICAL CUTANEOUS STIMULUS DURATION*

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A. INTRODUCTION

Investigations of the possible use of the skin for communication purposes have progressed from attempts to have *O*s discriminate vibration patterns produced by speech (3) to the successful mechanical vibration system reported by Geldard (4). Based on studies of the number of possible absolute identifications, Geldard's system utilized three stimulus intensities, three durations, and five loci as cues, a total of 45 combinations to which meaning was assigned. *O*s were trained to receive words at a faster rate (38 words per min.) than is usual with a well-known auditory system, Morse Code.

The writer has suggested that electrical current would be more useful for cutaneous communication than mechanical vibration (5). For example, approximately the same amount of current is necessary to reach the *RL* on the ear lobe as the finger, whereas with mechanical vibration considerably more energy is required to elicit sensations on fatty areas such as the calf of the leg or the abdomen than on bony areas such as the finger. It is thus reasonable to expect more efficient use of various parts of the integument with electrodes than with vibrators.

The writer has found the *O*s can make absolute identifications of electrical cutaneous stimulus intensity level (5, 6). Some three or four stimulus intensities could be used for signaling purposes, nearly the same as with use of mechanical cutaneous vibration (4). Judgments of electrical cutaneous stimulus duration are also as accurate and reliable as comparable judgments of auditory stimuli (8), indicating that duration may feasibly be used as a cue for electrical cutaneous signaling. Differential discrimination of electrical cutaneous stimulus duration has been investigated with standard durations of 0.5 to 1.5 sec. (7). The 0.5 sec. value was selected in order to avoid reductions in subjective intensity consequent upon use of very brief stimulus durations. The 1.5 sec. limit was chosen so as to avoid durations too long to be useful for cutaneous communication. In order to select stimulus

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durations for communication use which will minimize confusions and errors, the present investigation was undertaken to determine the number of possible absolute identifications of electrical cutaneous stimulus durations and the channel capacity for such identifications.

Information transmitted via absolute identifications is maximal when the stimuli presented to the *O* are subjectively equally spaced (1). The question is how to achieve this optimal spacing. Garner (2) maintains that an equal discriminability criterion is preferable (i.e., spacing by *j n d*'s) and Stevens (10) reports that direct estimates by the *O*s will yield a more accurate subjective spacing. The present experiment will investigate the difference if any, in information transmitted via absolute identifications of electrical cutaneous stimulus durations with use of stimuli spaced by each of these psychophysical scales.

B. EXPERIMENTAL

1. *Apparatus*

The apparatus was essentially the same as that of a previous study (5). A Grason-Stadler Model 471 timer was used to control stimulus duration.

2. *Subjects*

Twelve *O*s participated in this study. None had previously made absolute identifications of electrical cutaneous stimuli.

3. *Procedure*

Half of the *O*s made absolute identifications of stimulus duration with stimuli spaced an equal number of *j n d*s apart (7); these *O*s were designated as Group 1. Group 2 made absolute identifications with stimulus durations equally spaced by apparent subjective duration, based on direct estimation data. Group 2 *O*s made direct estimates of apparent stimulus duration in a preliminary session. Eleven stimulus durations, 100 msec. apart over a range of 0.5 to 1.5 sec., were presented for estimation in this preliminary session. The standard was 800 msec., and was assigned an arbitrary value of "10." *O*s were instructed that a duration apparently half as long should be called "5"; a duration apparently twice as long as the standard should be called "20." No restriction was placed on the size of the numbers which could be used for these estimates. A straight line fitted to median estimates in a log-log plot had a slope of 1.19 (Stevens, 10, reports a slope of 1.1 for apparent duration of white noise).

Stimulus values for Group 1 were: 500, 937, and 1500 msec., three categories; 500, 781, 1125, and 1500 msec., four categories; 500, 704, 937, 1220, and 1500 msec., five categories; and 500, 659, 845, 1052, 1279, and 1500 msec., six categories. Group 2 stimulus values were: 500, 985, and 1500 msec. in the first session; 500, 825, 1155, and 1500 msec., second session; 500, 740, 985, 1220, and 1500 msec., third session; 500, 705, 880, 1105, 1300, and 1500 msec., in the fourth session.

Stimuli presented for absolute identification of duration ranged from 0.5 to 1.5 sec.; 100 stimuli were presented in each session. *O*s made identifications of three durations in the first session, four durations in the next, then five durations, and six durations in the last session. A stimulus intensity of 6 db (*SL*) was used in all sessions.

Alternating current at a frequency of 100 cps was used. Current was applied to the index finger pad through a 12 mm. diameter electrode; a 25 mm. diameter inactive electrode rested on the palm.[1]

C. RESULTS

The mean amount of information transmitted (I_t) as a function of number of stimulus durations is plotted in Figure 1. The amount of information transmitted by individual *O*s is listed in Table 1. No gain in I_t resulted from the use of more than three durations except for Group 2 with six categories. A t-test (for related measurements) was used to evaluate I_t for 3 vs. 6 durations for Group 2. Results indicated no significant difference in I_t ($t = 1.32$; $p > .20$).

The "amount of I_t by the average O" (1, p. 98) for Group 1 vs. Group 2 was evaluated by Student's *t*. The *t* value of 1.44 was not significant ($p > .10$). The channel capacity appeared to be about 1.27 bits for both groups.

Mean per cent correct identifications for Group 1 was 93 per cent for three categories, 74 per cent with four categories, 59 per cent for five categories, and 52 per cent with six durations. Mean per cent correct identifications by Group 2 was 93 per cent, three categories; 77 per cent, four categories; 66 per cent, five categories; and 58 per cent with six *S-R* categories.

D. DISCUSSION

The channel capacity for absolute identifications of electrical cutaneous stimulus duration in this study was reached with use of three durations.

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[1] The writer takes this opportunity to express his appreciation to B. von Haller Gilmer, who supplied the tantalum used for electrodes minimizing fluctuations in skin resistance.

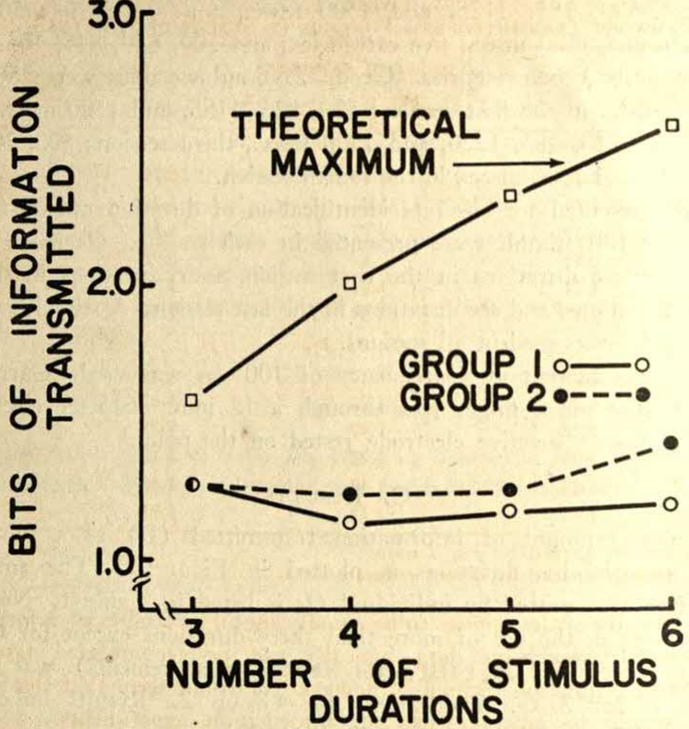

FIGURE 1
Mean Information Transmitted Via Duration with Two Types of Stimulus Spacing

The channel capacity for stimulus duration was thus found to be about the same as that for absolute identification of electrical cutaneous stimulus intensity level reported previously (5). It is possible that extension of the range of stimulus durations would result in an increase in information transmitted, as was the case with intensity when using an extended stimulus intensity range (6). If stimulus durations briefer than those of the present investigation are used, however, it should be noted that discriminability has been demonstrated to depend upon both stimulus intensity and duration when using durations of 0.5 sec. or shorter (7). The present study indicates that the use of stimulus duration as a cue in an electrical cutaneous communication system would be limited to three durations.

No significant difference in I_t was found when using stimuli equally spaced by direct estimates of apparent subjective duration vs. stimuli equally spaced by *j n d*s. Irrespective of the controversy over these types of psychophysical

TABLE 1
BITS OF INFORMATION TRANSMITTED AS A FUNCTION OF NUMBER OF STIMULUS DURATIONS

Observer number	3	4	5	6
		Group 1[a]		
1	1.26	0.84	0.79	1.00
2	1.36	1.21	1.26	1.41
3	1.17	0.77	1.13	1.07
4	0.95	0.82	0.98	1.03
5	1.51	1.81	1.33	1.34
6	1.37	1.34	1.51	1.34
		Group 2[b]		
7	1.28	1.13	1.34	1.42
8	1.20	1.00	1.11	1.36
9	1.22	1.47	1.28	1.47
10	1.25	1.22	1.12	1.48
11	1.29	1.43	1.68	1.76
12	1.41	1.18	0.98	1.04

(The "Number of categories" header spans columns 3 through 6.)

[a] Stimuli equally spaced by *j n d* data.
[b] Stimuli equally spaced by direct estimate data.

scales (2, 10), the scales appear to be equally useful in studies of information transmission. Inasmuch as data typically can be accumulated faster by Stevens' direct estimation technique, however, it would seem that this scaling procedure would be advantageous for information experiments.

Weaver (9, p. 109) postulated that . . . "the greater the information (available to the *O*), the greater is the uncertainty that the message actually selected is some particular one." It is interesting to note that a linear relationship was obtained herein between the amount of information in the stimulus situation and the equivocation of the *O*s. The slope of the best fitting straight line for the Group 1 data was 1.07, and for Group 2 data, 0.93. A similar (linear) relationship was found in a previous study of absolute identifications of stimulus intensity level (6); agreeing with reports of identifications of visual stimuli.

E. SUMMARY

The number of possible absolute identifications of electrical cutaneous stimulus durations was investigated. One group of *O*s identified stimuli equally spaced by *j n d*s. Another group was presented stimuli equally spaced by data from direct estimates of apparent duration.

The amount of information transmitted by the two groups was not

significantly different. Choice between these two scaling procedures, therefore, will not affect information transmission. The channel capacity of about 1.27 bits in this study indicates that three stimulus durations could be used in an electrical cutaneous communication system.

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AN EXPERIMENT IN LEADERSHIP TRAINING*

Fontana Unified Schools, California

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A. PROBLEM

This study was concerned with developing and implementing a leadership training program for two available classes of seniors at Fontana High School for the 1959-60 school year, and with assessing growth in the participating students during the training program by comparing scores on related tests for the beginning and end of referenced school year.

B. METHOD

1. *Groups Involved*

More than 70 senior students were initially enrolled in the two participating classes, but the findings contained in this report are for only 62 of these individuals for whom test data was available. There were 28 girls and 34 boys. The group ranged in age from 16 to 18 years, with a mean (M) age of 17.27 years, and with a standard deviation (SD) of 0.62 years. In terms of intelligence as measured by The California Test of Mental Maturity (CTMM), the M full scale IQ was 103.00, with an SD of 11.00, and the IQ's ranged from 90 to 150.

2. *Leadership Training Program*

The leadership training activities were developed as a portion of, and in conjunction with the problems of democracy (POD) course, but they involved both co- and extra-curricular activities as well. Generally, the leadership activities embraced a six point program with planned objectives as follows:

a. Self evaluation and analyses. In a very real sense the entire program in the POD class was focused on a better understanding and acceptance of one's self. The two main catalysts used to facilitate this objective were: (*a*) test scores, and (*b*) group counseling.

(1). *Test scores.* The IQ and multiple aptitude indexes from the school guidance battery provided objective evaluations for expected achieve-

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ment; while teacher marks and scores from the Iowa Tests of Educational Development (ITED) furnished evidence relative to student scholastic achievement. Expressed occupational choices and scores from the Kuder Occupational Interest Inventory provided data relative to life goals. In addition, select tests were administered relative to: social insight, leadership values, leadership decision patterns, personality tension and needs, and sociometry.

(2). *Group counseling.* From time to time group counseling and discussions were held relative to self understanding. On numerous occasions the school psychologist conducted sessions relative to interpretation of test scores, and on the subject of leadership training and development.

b. Critical thinking development.

(1). *Propaganda.* This aspect of the program dealt with such major topics as: (*a*) mastery of stress, and (*b*) the struggle for men's minds. Emphasis was placed on the role of emotions in man's decisions, propaganda devices, propaganda analysis, and how not to be influenced by propaganda.

(2). *Attitudes.* This area dealt with the attitude and morale of people, and efforts were made to depict the significance of one's attitude relative to his productivity. It included such other topics as: the nature of attitudes, the characteristics of high morale, the origin of attitudes, the relation between attitude and emotions, and effective ways to improve one's attitudes.

(3). *Motivation research.* This involved the initial reading of Vance Packard's *Hidden Persuaders,* and was followed by a monitored discussion by the school psychologist. The discussion emphasized some of the following topics: emotional factors in merchandising, consumer motivation, depth probing in merchandising, self-image and product loyalty, and motivational analysis.

c. Human motivation and frustration. Under human motivation, efforts were made to illustrate the relationship between needs and incentives, and then to show how adaptation and "self-actualization" are designed to reconcile such dynamics. Various types of conflict situations were described, and detailed explanations were provided relative to level of aspiration research and theory.

Under frustration reference was made to the Rosenzweig reaction types: (*a*) object dominance-emphasis on magnitude of problem, (*b*) need persistence-emphasis on solution to the problem, and (*c*) ego defense-emphasis on placing blame for the problem. Also, attention was directed to the difference between motivated and frustrated behavior patterns, and with ways for dealing with frustration.

d. Problem solving and decision making. Here theory and actual opportunity were provided for both individual and group problem solving experiences. This included: developing constructive thinking, decision making under uncertainty, and games and activities in actual decision making.

e. Developing leadership ability.

(1). *Leadership values.* This area included values and ideals relative to one's philosophy in various leadership roles, i.e., facilitating group objectives, facilitating group cohesion, and developing individual status; and it included the following major topics of concern: personal integrity, consideration for others, mental health, technical information, decision making, and teaching and communication.

(2). *Leadership decision patterns.* During this period certain professional literature in the area was examined and activities were employed to develop student acquaintance with four leadership patterns: (*a*) laissez faire-decisions by individual members, (*b*) democratic cooperative-decisions based on will of group, (*c*) autocratic submissive-decision based on research and resource materials and evidence, and (*d*) autocratic aggressive-leader centered decisions. This area included the usual topics under group dynamics, and human sensitivity training, i.e., role playing, social opinion and perceptions, self concept evaluations, etc.

f. Interaction with community leaders. Numerous opportunities were afforded members of the two groups to meet and interact with community leaders from varying walks of life. This included group organized discussion periods, lectures, and individual student visits.

3. *Tests Utilized*

a. Leadership.

(1). *Leadership philosophy or values.* The Leadership Q-Sort Test (LQT) (7) was utilized. It includes 60 items which are critical characteristics of an effective leader which the person taking the test rates on an 11 point scale. The test is based on Q-methodology, and the person's ratings are compared with similar ratings by outstanding leaders in terms of a Pearson *r* (coefficient of correlation).

(2). *Leadership decision patterns.* The Leadership Ability Test (LAT) (6) was utilized. It is made up of 50 leadership situations in which the subject taking the test elects one of four decision patterns as a best solution; thus, projecting his characteristic leadership decision pattern (laissez faire, democratic cooperative, autocratic submissive, and autocratic aggressive). Varying norms are provided for comparative purposes, and the test is based on usual R-methodology.

(3). *Social insight.* The Test of Social Insight-Youth Edition (TSI) (4) was utilized. It provides the characteristic choice of the subject taking the test for solution to the 60 social problems which constitute the test items. The part scores on the test are represented by the five multiple choices provided for each of the 60 items (social problems): withdrawal, passivity, cooperative, competitive, and aggressive. The total score is a composite of the five part scores based on "b" weights that discern optimumally between persons in prison and typical individuals.

(4). *Personality tension and needs.* The Group Personality Projective Test (GPPT) (5) was utilized. It contains 90 stick figure drawings, involves the projective concept, incorporates factorial validity, and has the following part scores: anxiety, nurturance, withdrawal, indecision, affiliation, and distrust. The total score is a composite of the part scores that discerns optimumally between neuro-psychiatric patients and typical individuals.

(5). *Sociometric ratings.* This is a social distance ratings for each member of the group based on the "peer status" ratings (PSR) of the total membership of the two separate groups. Students were asked to give their first three choices of class members to work with on class committees, and to indicate any individuals they prefer not to be assigned with. The peer ratings were assigned values of 5, 3, 1, and —4; respectively.

C. Findings

The data contained in Table 1 indicates statistically significant leadership and social insight growth and development by the 62 students involved in this study, and as indicated by scores from the three tests utilized, i.e., LQT, LAT, and TSI. These findings are of particular interest in light of another study conducted in the Phoenix high schools during the 1958-59 school year with matched groups of 9th and 11th grade students, and showing no significant change over a two year period when no organized leadership training program is present. The *M* change for all tests was in a direction toward outstanding leaders and toward persons with good social insight. The SD change for all tests was toward less variation, and with the LQT and TSI change being statistically significant. The greatest change took place in leadership decision pattern structure and social insight.

TABLE 1
COMPARISON OF LEADERSHIP AND SOCIAL INSIGHT TEST SCORES FOR BEFORE AND AFTER THE LEADERSHIP TRAINING PROGRAM (N-62)

Data	The Leadership Q-sort Test—total score	The Leadership Ability Test—total score	The Test of Social Insight—total score
September, 1959, Administration (1st)			
Mean	.355	13.00	32.60
Standard deviation	.195	2.26	21.20
June, 1960, Administration (2nd)			
Mean	.431	10.44	19.90
Standard deviation	.144	2.14	9.20
Differences Between 1st and 2nd Administration			
Mean	** .076	**2.56	**12.70
t Value (critical ratio)	3.30	8.00	6.23
Standard deviation	**— .051	—0.12	**12.00
t Value (critical ratio)	3.15	0.53	6.66

* Significant at 5 per cent level.
** Significant at 1 per cent level.

The inter-correlations for the various test scores and data are contained in Table 2. The data indicate that those individuals with the better leadership and social insight initial scores profit most from the leadership training program. Students with the highest IQ's and the best initial leadership decision patterns receive the highest peer status ratings (are most popular among peers). The best students as indicated by the ITED total score have best leadership values, the best personality patterns, least tension, best IQ's, but least desirable leadership decision patterns at the end of the study, and educational development appears to be unrelated to social insight either before or after the study. Students with best personality patterns have best leadership values, have no relationship to initial leadership decision patterns, but have a significant negative relationship to terminal leadership decision patterns. Students with good social insight patterns tend to have good initial leadership values and decision patterns, but to be negatively related to terminal leadership values and decision patterns. Initial leadership values and leadership decision patterns are significantly related, but terminal ones appear to be unrelated.

D. SUMMARY

This study was concerned with developing and implementing a leadership training program for two available classes of high school seniors, and with assessing growth and development by comparing test scores for the

TABLE 2

INTER-CORRELATION OF TEST SCORES (PEARSON *r*'s) (N-62)

Tests		X_1 LQT total	X_2 LQT total	X_3 LAT total	X_4 LAT total	X_5 TSI total	X_6 TSI total	X_7 GPPT TRQ	X_8 GPPT total	X_9 CTMM IQ	X_{10} ITED total	X_{11} PEER status
The Leadership Q-sort Test—total score (1st)	X_2		**.470	**.401	.099	.174	*.255	**.392	**.321	**.355	**.375	.043
The Leadership Q-sort Test—total score (2nd)	X_2			.161	—.061	—.119	—.108	.211	**.384	**.394	**.516	.213
The Leadership Ability Test—total score (1st)	X_3				**.345	.107	**.524	.032	.001	**.377	.219	*.246
The Leadership Ability Test—total score (2nd)	X_4					—.084	*—.257	*—.315	*—.276	.152	**—.462	—.024
The Test of Social Insight—total score (1st)	X_5						**.323	—.124	—.002	.100	.094	.069
The Test of Social Insight—total score (2nd)	X_6							.052	—.028	.133	.052	.077
The Group Personality Projective Test—TRQ (2nd)	X_7								**.792	—.081	**.395	.001
The Group Personality Projective Test—total (2nd)	X_8									.171	**.367	.067
Full Scale IQ—CTMM	X_9										**.631	*.293
Iowa Tests of Educational Development—total score	X_{10}											.223
Peer status ratings for Social Distance (2nd)	X_{11}											

* Significant at 5 per cent level .250.

** Significant at 1 per cent level .325. 1st = Sept., 1959 2nd = May, 1960 beginning and end of the training program. The leadership training involved the following major aspects: self evaluation and analyses, critical thinking development, human motivation and frustration, problem solving and decision making, developing leadership ability, and interaction with community leaders. The findings indicate significant growth in leadership and social insight during the training program. A similar study conducted in the Phoenix high schools indicated no growth over a two-year period where no organized leadership program was conducted.

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SOME CONSEQUENCES FOR JUDGMENT OF MANIPULATION OF THE STIMULUS DISTRIBUTION*

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A. INTRODUCTION

Though the method of single stimuli is used, a stimulus is not judged by itself but with respect to some established scale of judgment. There is some controversy as to whether such a scale is determined primarily by the range of available stimulation, or by some neutral point or region which is a weighted average of the stimulation and therefore depends in part upon the intra series distribution of stimuli. Volkmann maintains that "it is the end stimuli that control the principal properties of the judgment scale—(and) we should not make the mistake of thinking that the operation of an absolute scale requires some implicit or averaged value equivalent in its effect to a standard stimulus" (Volkmann, 1951); while Helson, on the other hand, believes that "the stimulus which represents the weighted average effect and which calls forth the neutral response can be regarded as the stimulus to which the organism is attuned (Michels and Helson, 1949)—the structure of the behavioral field is fixed by the position of the neutral point, the frame of reference is completely defined once its value is known" (Helson, 1948).

There is evidence in support of each of these views (see, e.g., Helson, 1959; Hunt, 1941; Volkmann, 1951). There have been some studies concerned with the effect on judgment of skewing of the stimulus distribution; while the results have not been unequivocal, generally there were changes in judgment away from the direction of the skewing (see, e.g., Fillenbaum, 1956, 1960; Parducci, 1956; Parducci, Calfee, Marshall and Davidson, 1960). The study to be reported here made use of situations where, as a result of systematic manipulation of the stimulus distribution, the two views as to the determinants of judgment entail rather different predictions.

In the first experiment to be reported here the stimulus range was kept

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[1] Experiment 1 constituted part of a master's thesis done at the University of California at Berkeley under the direction of Prof. D. A. Riley.

constant while the distribution was systematically varied being skewed toward the high end in one instance, and toward the low end in another. Here we might expect systematic differences in judgment on the basis of an Adaptation Level (AL) approach, and no such differences in terms of an end anchor hypothesis. In the second experiment both the stimulus range and the intra series distribution of stimuli were varied between conditions, but in such fashion that the theoretical neutral point (AL) remained constant. In this case on the basis of an AL approach one would not expect any systematic differences in judgment of the common stimuli from condition to condition, while in terms of an end anchor hypothesis changes in judgment of a specified kind could be predicted.

B. EXPERIMENT 1

1. *Method*

a. Experimental Design. The stimulus range was kept constant and the distribution of stimuli was varied over the range as given in Table 1. According to Helson's approach the AL should be higher in Condition C than in Condition B, and higher in B than in A, theoretical AL values computed using an equation suggested by Helson (1947) are: Condition A 88.9 gms., Condition B 90.9 gms., and Condition C 92.8 gms. If a shift in scale center is accompanied by a change in the evaluation of all stimuli each stimulus should be judged heavier in Condition A than in Condition B, and heavier in Condition B than in C. On an end anchor hypothesis only random differences between conditions are to be expected in the evaluation of stimuli.

b. Subjects, equipment, and procedure. *S*s were 30 college students, 15 were used in the original run of the experiment, another 15 in a replication. Each *S* served as his own control and was randomly assigned to one order of the three experimental conditions. For all *S*s each condition was run in a single session separated from the others by two or three weeks.

Each *S* was given 20 trials in each condition, order of stimulus presentation within trial being randomized. Judgments on the last 15 of these 20 trials constituted the data. The weights, small flat cylinders filled with lead and wax, were set on a turntable. *S* at no time saw the weights or knew how many different ones there were. Instructions were as follows:

> You know this is an experiment in weight lifting. After you have been blindfolded at my signal of O.K. pick up the weight between your thumb and first two fingers, lift it from the wrist, give your judgment and put it down. Then I'll rotate the next weight under your hand,

TABLE 1

		84 gms.	90 gms.				
Condition A	78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	108 gms.	114 gms.
			90 gms.		102 gms.		
Condition B	78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	108 gms.	114 gms.
					102 gms.	108 gms.	
Condition C	78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	108 gms.	114 gms.

> you'll judge that and so on. Use the following categories in your judgment (this was repeated):
>
> 1 Very Light 2 Light 3 Medium 4 Heavy 5 Very Heavy
>
> At first you won't know what to say but you'll soon get the feel of it. Try to use all the categories of judgment.

After the first trial was completed (all 9 weights lifted) *S* was told: "You have now lifted all the weights from the heaviest to the lightest." After the first 10 trials *S* was given a break for about two or three minutes—thus there were two series of 90 judgments, with about four or five seconds between successive judgments in each series.

c. Results. The mean category number assigned to each weight in each condition is presented in Table 2; the significance of the difference between mean category numbers assigned each weight in the various conditions is shown in Table 3. Inspection of these tables makes it quite clear that skewing the stimulus distribution toward the light end does lead to upward shifts in the evaluation of stimuli while skewing the distribution toward the heavy end has no effect (there is no difference between Conditions B and C).[2]

TABLE 2
EXPERIMENT 1: MEAN CATEGORY NUMBER ASSIGNED EACH WEIGHT IN EACH CONDITION

	Weight						
	1	2	3	4	5	6	7
Condition A	2.08	2.60	3.24	3.71	4.19	4.50	4.76
Condition B	2.00	2.40	3.00	3.42	3.99	4.38	4.67
Condition C	2.04	2.41	3.05	3.40	3.98	4.38	4.70

TABLE 3
EXPERIMENT 1: SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN CATEGORY NUMBERS ASSIGNED EACH WEIGHT IN EACH CONDITION — *t* VALUES

	Weight						
	1	2	3	4	5	6	7
Condition A vs Condition B	1.03	2.07*	2.85**	4.36**	2.38*	1.98*	1.98*
Condition A vs Condition C	.42	2.00*	1.90*	4.25**	3.48**	2.71**	1.56
Condition B vs Condition C	—.52	—.07	—.63	.25	.11	—.21	—.93

For one tailed test with 29df:
* $p < .05$.
** $p < .01$.

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[2] These results were the same in each replication of this experiment.

For each weight it was determined how many *S*s assigned it a higher mean category number in one condition than in either of the others. Comparing Conditions A and B we find that a majority of *S*s judged every weight heavier when appearing in Condition A than B (for four of the seven weights the difference was significant at better than the 5 per cent level, using a sign test), that a majority of *S*s judged every weight heavier when appearing in Condition A than C (for five of the seven weights the difference was significant at better than the 5 per cent level, using a sign test), and that there was very little difference beween Conditions B and C.

The mean of the stimuli assigned to the middle, neutral category (with total N of judgments for each weight equated) was taken as the value of the AL. These values were as follows: Condition A 89.1 gms., Condition B 91.3 gms., and Condition C 90.8 gms. For Conditions A and B these values are rather close to the predicted values, of 88.9 gms. and 90.9 gms. respectively, in the case of Condition C where the predicted value was 92.8 gms., there is a considerable discrepancy. In fact, as noted above, there was a considerable difference in judgment between Condition A, with lower AL, and Conditions B and C for which the obtained AL values are fairly similar.

C. EXPERIMENT 2

1. *Method*

a. Experimental design. Table 4 gives the conditions of the experiment. Since the stimulus distributions were manipulated so as to yield approximately the same theoretical AL for all conditions (predicted ALs: Condition A 84.9 gms., Condition B 85.2 gms., Condition C 84.9 gms.) on Helson's approach one should only expect random differences between conditions in the judgment of the five common stimuli. On an end anchor hypothesis one might expect each common stimulus to be judged lighter in Condition A than in Condition B, and lighter in Condition B than in C since each common stimulus is relatively closer to the light end of the stimulus range or further from the heavy end of the range in Condition A than in Condition B, and this is true again when Condition A or B is compared with Condition C.

b. Subjects, equipment, and procedure. The set-up was the same as that in Experiment 1 with the following exceptions: (*a*) there were 18 *S*s, and (*b*) each *S* made 160 judgments in each condition, the last 120 of these constituting the data. Thus in Condition B each weight was judged 24 times, for scoring purposes, while in Condition A all weights save the two lightest were judged 15 times each, these latter being judged 30 times each; and in

TABLE 4

		78 gms.	84 gms.				
Condition A		78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	108 gms.
Condition B		78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	
Condition C	72 gms.	78 gms.	84 gms.	90 gms.	96 gms.	102 gms.	
					96 gms.	102 gms.	

Condition C the two heaviest weights were judged 30 times each, all others being judged 15 times each.

c. Results. The mean category number assigned to each weight in each condition is presented in Table 5; the significance of the difference between mean category numbers assigned each weight in the various conditions is shown in Table 6. It may be seen that, on the average, each of the five common weights was judged lighter in Condition A than in either Conditions B or C, and that there is very little difference in judgment for these latter conditions. Inspection of Table 6 shows that three of the five differences reach significance when Condition A is compared with Condition B, and one difference reaches significance when Conditions A and C are compared, all the other differences being in the same direction.

TABLE 5

EXPERIMENT 2: MEAN CATEGORY NUMBER ASSIGNED EACH WEIGHT IN EACH CONDITION

	Weight						
	1	2	3	4	5	6	7
Condition A		2.35	2.81	3.39	3.99	4.38	4.64
Condition B		2.40	3.01	3.62	4.18	4.47	
Condition C	1.91	2.49	2.99	3.67	4.14	4.49	

TABLE 6

EXPERIMENT 2: SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN CATEGORY NUMBERS ASSIGNED EACH OF THE COMMON WEIGHTS IN EACH CONDITION — *t* VALUES

	Weight				
	2	3	4	5	6
Condition A vs Condition B	— .92	—2.92**	—2.70**	—2.21*	—1.23
Condition A vs Condition C	—1.48	—1.36	—2.98**	—1.69	—1.31
Condition B vs Condition C	— .94	.22	— .55	.40	— .27

For one tailed test with 17df:
* $p < .05$.
** $p < .01$.

The results of an analysis of individual cases are consistent with the above. Comparing Conditions A and B we find that a majority of *S*s judged every weight heavier when appearing in Condition B than A (for two of the six weights the difference was significant at better than the 5 per cent level, using a sign test), that a majority of *S*s judged every weight heavier when in Condition C than A (for one of the six weights the difference was significant at better than the 5 per cent level, using a sign test), and that there was hardly any difference between Conditions B and C. Thus while there is some tendency for weights to be judged lighter in Condition A than in Condition B or C, there is almost no difference between these latter conditions.

As in Experiment 1, AL values were computed from the data, these were: Condition A 88.4 gms., Condition B 86.8 gms., and Condition C 84.1 gms. It is clear that these values differ considerably from each other, and also from the predicted values. It may be worth pointing out that even though there is almost no difference in judgment between Conditions B and C, there is a substantial difference in the ALs for these conditions.

D. Discussion

To begin, let us consider the bearing of the results on the hypotheses under consideration, and the mutual compatibility of the results from the two experiments. In Experiment 1 the shift in judgment of stimuli from Condition A to Condition B is consistent with AL theory, but the lack of shift in judgment from Condition B to Condition C is inconsistent with such an approach. This latter finding is compatible with an end anchor hypothesis, but the former is not. In Experiment 2 the difference in judgment of the common stimuli between Condition A and the other conditions was to be expected on an end anchor hypothesis but not on AL theory, while the lack of difference in judgment between Conditions B and C is compatible with AL theory but not with an end anchor hypothesis. If one were to extrapolate from the data of the first experiment then the finding that skewing to the heavy end had no effect on judgment together with knowledge, on the basis of previous work, that extension of the stimulus range does lead to changes in judgment might lead to the prediction that in Experiment 2 there would be differences in judgment between the control condition and Condition C (where the range is extended to the light end with skewing to the heavy end). As was seen no such differences were obtained. It might be worth pointing out that the findings of this study again illustrate the necessity of a control condition as a guard against misinterpretation of results. If data from such a condition had not been available we should have been led to regard the results of the first experiment as completely consistent with an AL approach and inconsistent with an end anchor hypothesis and the results of the second experiment as consistent with the end anchor hypothesis and somewhat inconsistent with AL theory. As it is, it seems clear that the results of each experiment are in part consistent, and in part inconsistent with each of these interpretations; and that the results from the two experiments are not mutually compatible.

It might be noted that, in a very general way, AL theory has two aspects: (*a*) the assertion that the AL is some pooled function of stimulation, and (*b*) the assertion that the AL determines the judgment of stimuli. While the results of Experiment 1 may not be consistent with (*a*) they are compatible with (*b*) since there were few differences in judgment between Conditions B and C where the obtained AL values were rather similar (91.3 gms. and 90.8 gms. respectively). However, in Experiment 2 we find a substantial difference in the obtained AL values for Conditions B (86.8 gms.) and C (84.1 gms.) with hardly any differences in judgment, a result that would seem incompatible with (*b*) above.

The difference between adjacent stimuli was always 6 grams, since such an increment would be less discriminable for heavier than the lighter weights (indeed there is some tendency for differences in mean category number assigned adjacent weights to be somewhat smaller for the heavier weights) it might be argued that skewing the stimulus distribution toward the heavy end (in Experiment 1) should have less effect than skewing it to the light end—as was the case. Note, however, that in Experiment 2, Condition C, skewing the stimulus distribution toward the heavy less discriminable end together with range extension toward the light more discriminable end did not result in any judgment shifts for the common stimuli. If distribution skewing toward the heavy end has little or no effect because of the lesser discriminability of stimuli toward this end, then extension of range toward the other end should have resulted in judgment shifts in Condition C. Since there were no such shifts the suggestion cannot be taken very seriously.

The salient feature of the results, and the one that perhaps makes for greatest difficulty in interpretation, is that on some occasions manipulation of the stimulus distribution does lead to judgment shifts and on other occasions comparable manipulation has no effect. It has been suggested that some of the findings in the judgment situation may be largely "semantic" effects consequent upon restrictions in the response language available to *S* (Campbell, Lewis, and Hunt, 1958). But it seems clear that whatever the restriction in response categories this was the same in all conditions of both experiments and can hardly be invoked as an explanation for differential effects. Similarly, if it is asked whether Helson's "equivalence conditions" (see Michels and Helson, 1949) are met in the circumstances of this study it must be answered that these are met equally well or poorly in Conditions A and C of both experiments, and therefore this cannot be used to account for the differential effects of these conditions.

There is at least some evidence in the literature consistent with the finding that skewing of the stimulus distribution toward one end may lead to judgment shifts while comparable skewing toward the other end may have no effect. Thus Fehrer (1952) in an attitude scale study found that skewing the item distribution toward the militaristic end had considerable effect in changing the evaluation of items while skewing the item distribution toward the pacifist end led to almost no changes in item evaluation from the control condition.

E. SUMMARY

Two experiments were conducted to test some implications of rather different conceptions of the judgment process, viz. adaptation level (AL) theory which stresses the importance of a neutral reference level in the making of judgments and the end anchor hypothesis which stresses the importance of the terminal stimuli in anchoring the judgment scale. In the first experiment stimulus range was kept constant, the distribution of stimuli over the range being systematically varied; here on an AL theory only one might expect systematic judgment changes. In the second experiment stimulus range and the distribution of stimuli were varied simultaneously so as to keep the predicted neutral level constant; in this instance systematic shifts in judgment may be expected in terms of the end anchor hypothesis.

The results of each experiment were in part consistent, and in part inconsistent with each approach; and the data from the two experiments did not appear to be mutually compatible. Some comments were made regarding difficulties in the interpretation of these results, the main purpose of this paper being to present some judgment data which are difficult to interpret in commonly used terms.

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HYPNOTIZABILITY*

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In a discussion on the reality of hypnotic behavior by Dr. T. X. Barber with critiques by W. I. Heron and C. Leuba at the 1960 APA meetings, evidence was submitted for a better than moderate correlation between persons following hypnotic type suggestion without the preliminaries of developing a hypnotic trance and those in which usual hypnotic procedures were used. The discussion finally focused on the problem that there is still little known of the basic characteristics distinguishing persons who are easily hypnotized from those who are not.

One important dimension in differentiating the easily suggestible from those resistant to hypnotic or non-hypnotic suggestion may relate to variations in development of autonomous central activity (Hebb, 1949) in different individuals. It is conceivable that some persons may develop (in the sense of statistical frequency) a large number of patterns of central activity which are not easily triggered by external stimulus input alone. Eysenck and Furneaux (1945) discussed the relative weakness of inhibitory (central) tendencies in those showing high primary suggestibility. Thus there would be individual differences (compounded by other factors) in the readiness to respond to the immediate stimulus configuration indicating some difference in the extent to which autonomous processes have achieved relative independence of sensory control. The observed decreasing suggestibility with advancing age would be consistent with this notion.

As in the case of other psychological variables considered in generalization, one would expect intra-individual variations in the abstracted variable. Just as the jovial person is not likely to be amused at his father's funeral, the suggestible individual would tend to be somewhat response-specific to the stimulus input, except that he would be characterized by a more frequent number of situations to which response would be made as if controlled by the stimuli.

Under this hypothesis, the persons who most readily fall for the hard

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sell, who are impelled to pick up the phone during the TV commercial, or who are most responsive to super market displays and who may respond readily to "subliminal" gimmicks should also be easily hypnotized. Likewise, one would expect that the delinquent who sees the key in the ignition of someone else's parked car and without hesitation gets in and drives off would be a good hypnotic subject, or is readily suggestible.

Could it be that the hypothesis is also basic to some aspects of the concept of personality rigidity? It would be interesting to determine the relative suggestibility of individuals so characterized.

The hypothesis, in sum, represents the speculation that hypnotizability and suggestibility are a function of inter-individual variations in sensory versus autonomous control of behavior, the more suggestible or hypnotizable persons being those showing lower levels of internal inhibitory control over the many possible behaviors of which a human is capable. Such a generalization may be confounded by the many possible circumstances in which stimulus cues occur in the presence of hardened motivational tendencies, so that particular behaviors can be evoked easily in the individual ordinarily well controlled by internal organization.

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SOCIAL DESIRABILITY RESPONSE SET: ERROR OR PREDICTOR VARIABLE*

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A. PROBLEM

The importance of response set as a source of performance variance on psychological tests was emphasized by Cronbach in two early articles (1946, 1950). He observed that the score on objective psychological measures is determined not only by response to item content but also by response sets to item form. Although Cronbach admitted that response sets can be "to a small degree correlated with external variables" and thus a possible source of valid variance, he placed considerably more emphasis upon response set as a source of invalidity in tests constructed to measure content-defined traits.

Edwards (1959) has developed the Personal Preference Schedule (EPPS), a multi-variable, objective personality test for which item statements were judgmentally selected as measures of personality traits. Since response to content was crucial to this type of questionnaire, Edwards concerned himself with social desirability response set, which he viewed as an extraneous source of variance the effects of which were to be eliminated if possible. Edwards (1953) demonstrated that the average social desirability ratings of his test statements were highly correlated ($r = .87$) with the probability of endorsement as self-characteristic when presented in a "yes-no" test format; yet there was no intermediate empirical demonstration that a reduction in predictive accuracy resulted from the influence of social desirability set upon test performance.

A large share of the published research concerned with the EPPS has addressed itself to the question of whether Edwards' procedure of matching statements for social desirability and instructing the test-taker to choose the more self-characteristic of the paired alternatives has minimized or eliminated social desirability response set as a source of performance variance. In contrast to the amount of research time which has been invested in the assessment of the relationship between social desirability of responses and their endorsement on the EPPS and other objective personality questionnaires,

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the paucity of evidence regarding the effect of this relationship upon predictive validity is striking. The purpose of the present study was to test the hypothesis that the tendency for a person to respond to the social desirabililty of test items decreases the predictive validity of the test. More specifically, Edwards' technique of matching statements within items for social desirability was used to force the test-taker to endorse one alternative or the other based on more accurate self-description rather than relative desirability, and the prediction from less perfectly matched and more perfectly matched items was compared. Based on the experimental hypothesis, it was predicted that EPPS scales in which the effect of social desirability as a source of response variance has been substantially decreased by improved matching should show higher relationships with external criteria than scales in which social desirability is a more influential determiner of performance.

B. PROCEDURE

1. *Subjects*

The *S*s in this study were 85 students (44 females, 41 males) in an undergraduate class at the State University of Iowa. The total group was administered the EPPS under standard conditions during the first class meeting of the semester. About two months later, 57 volunteers from the original 85 *S*s rated the 135 different EPPS statements on a nine-point scale from highly socially undesirable to highly socially desirable. This experimental group included 29 males and 28 females.

2. *Standard EPPS Scales*

The Edwards Personal Preference Schedule is a 210 item, objective, multivariate questionnaire. Items are composed of two statements, each measuring a different personality trait but matched for group social desirability value. The final score on any of the 15 scales corresponds to the number of times out of 28 for which the test-taker has endorsed the scale-related statements as more self-characteristic than their paired alternates.

3. *Individualized EPPS Scales*

Two of the Edwards scales, Achievement and Abasement, were selected for revision. The 54 items which included an Achievement statement or an Abasement statement were rearranged separately for each of the 57 *S*s who had completed the desirability ratings so that the paired statements in each item were perfectly or as close to perfectly matched for *that individual's* social desirability values as was possible.[1] This was accomplished by noting the social desirability value on the nine-point rating scale attributed to the Achievement or Abasement statement by the *S* in a given item and then selecting the best matched statement for him measuring the same trait as the original alternative statement. In those cases where the closeness of matching could not be improved for an individual by selecting a new statement, the standard alternate statement from the EPPS was retained. The improvement in closeness of social desirability matching for the individualized Achievement and Abasement scales relative to their standard form was evaluated by finding the mean per cent of the 54 items in both scales for which items were perfectly matched for the experimental *S*s. An average of about 26 per cent of the items on the standard EPPS Achievement and Abasement scales included perfectly matched statements in terms of each individual's social desirability values, while for the revised Achievement and Abasement scales about 70 per cent of the items were perfectly matched for the same individuals.

The complete EPPS was then reproduced[2] in mimeographed form with the item sequence corresponding to the standard format except that each of the 57 *S*s had his own special set of Achievement and Abasement items which were entered by typewriter. The individualized tests were administered about four months after the initial EPPS was given.

4. *Individualized Control EPPS Scales*

The remaining 27 *S*s of the original group were used to evaluate the possible effects of changed appearance of the second EPPS independent of changed item content or the effects of any other factor differential to the two testing sessions. These control *S*s were given the mimeographed-typewritten EPPS which included items identical to those in the published test, receiving personally identified test forms as had the experimental *S*s. Standard instructions were used for all *S*s. In addition, an abbreviated form (ISV) of the Wechsler Adult Intelligence Scale, including the Information, Similarities, and Vocabulary subtests, was administered to all *S*s. This shortened form has been shown to correlate .92 with the Full WAIS battery (Maxwell, 1957).

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[1] Heilbrun and Goodstein (In press) have recently demonstrated that the individual's own social desirability values assigned to EPPS statements are good predictors of performance on this test. College students endorsed the individually more desirable statement as more self-descriptive on two out of every three items for which the paired statements differed in individual values. It was also shown that individual social desirability values were better predictors of performance than were the group mean social desirability values used by Edwards in the original matching of statements on the EPPS. Accordingly, it can be presumed that matching statements by individual values is a more effective means of reducing the influence of social desirability on this instrument than Edwards' procedure of matching by group mean values.

[2] The investigators would like to extend their appreciation to Dr. Allen L. Edwards for his permission to reproduce the EPPS in an experimentally revised form.

The external criterion which was used to compare the predictive validity of the standard and individualized Achievement scales was the college grade-point average for the semester during which the tests were administered with intellectual ability (ISV) held constant. The criterion used to compare the Abasement scales was the discrepancy between grade-point average for the semester prior to the experiment and the final grade which the *S* predicted he would obtain in the course on the first day of the semester. This represented the discrepancy between the most recent experience in college performance and anticipated performance, high abasing students being expected to predict below the previous performance level and low abasing students being expected to predict above the previous performance level. This abasement criterion was used in a previous study (Heilbrun, 1959) and related significantly and appropriately to a measure of abasement.

There are established sex differences on the EPPS Achievement and Abasement scales in a college population (Edwards, 1959), so the analyses in this study either treated proportionally combined sex groups or treated sex groups separately. Since the Achievement scale analysis utilized correlational techniques, sexes were combined proportionally to increase the size of the groups and the stability of the correlations. Sexes were evaluated separately in the Abasement scale analysis because of the 53 *S*s (out of 85) for which previous semester GPA's were available, 34 were females and only 19 were males, thus making proportionality unfeasible. The 32 *S*s who were not considered in this analysis represented an unexpectedly high 38 per cent of transfer or reregistered students in this undergraduate sample.

C. RESULTS

1. *Standard vs. Individualized Achievement Scales*

The zero-order correlations relevant to the Achievement scale analyses are presented in Table 1. The predictive validity of the standard EPPS Achievement scale was evaluated by determining the first-order partial correlation between Achievement scores and semester college grade-point average with the influence of intelligence held constant. This value, $r = .28$ for 54 *df*, was significant at the five per cent level of confidence. The correlation between the individualized Achievement scale and college GPA with intelligence partialled out was $r = .07$, which does not differ reliably from zero. The partial correlation between the standard Achievement scale and semester GPA did not differ significantly ($z = 1.15$ for 108 *df*, $p > .20$) from the partial correlation between the individualized Achievement scale and semester GPA.

TABLE 1

CORRELATIONS BETWEEN VARIOUS ACHIEVEMENT SCALE RAW SCORES AND ISV AND GPA MEASURES
($N = 57$)

Scale	ISV intelligence measure	Semester GPA
Standard achievement	.51	.43
Individualized achievement	.46	.25
ISV		.42

The possibility that the failure to enhance prediction from the EPPS Achievement scale following reduction of social desirability variance might be accounted for by the changed format of the test or some other factor differential to the two testing sessions was evaluated by comparing prediction from the standard Achievement scale scores obtained under the two conditions. The Achievement Scale-GPA correlation with intelligence partialled out for the 27 control *S*s was —.06 using the published scale and .11 using the mimeographed-typewritten scale. Neither value differed significantly from zero, but since the latter correlation was higher and in the expected direction, there is no support for the contention that the altered appearance of the mimeographed form (or any other differential condition at second testing except revised items) could account for the failure to enhance prediction.

2. *Standard vs. Individualized Abasement Scales*

The high abasing and low abasing criterion groups were formed by cutting the distribution of predicted grade minus previous semester grade-point average discrepancy scores at or near the median. Since most students predicted grades above their previously obtained average, the high abasing groups included *S*s who predicted below this average or slightly above while low abasing groups were made up of those students predicting well above this average. Separate analyses were conducted for male and female high and low abasing groups. The means, standards deviations, and comparisons between means for the standard and individualized Abasement scales are given in Table 2.

For the males, the standard Abasement scale reliably discriminated between high and low abasing *S*s *but in the wrong direction* (i.e., high abasement *S*s had the lower scores on the Abasement scale). The individualized Abasement scale did not improve predictability since high abasing males had a significantly lower mean score than low abasing males, also a reversal of expected direction. The arithmetic differences between means in the two analyses were almost identical (standard Abasement scale difference = 4.43, individualized Abasement scale difference = 4.60).

TABLE 2

STANDARD AND INDIVIDUALIZED ABASEMENT SCALE MEANS AND STANDARD DEVIATIONS AND COMPARISON BETWEEN MEANS FOR MALE AND FEMALE HIGH AND LOW ABASING GROUPS

Scale	*N*	Mean	*SD*	*N*	Mean	*SD*	*t*	*p*
	Male high abasing group			*Male low abasing group*				
Standard abasement	10	9.90	4.68	9	14.33	3.83	2.12	.05
Individual abasement	7	5.57	1.19	6	10.17	3.23	—[a]	.05
	Female high abasing group			*Female low abasing group*				
Standard abasement	18	14.17	5.34	16	11.38	3.36	1.77	.08
Individual abasement	11	11.09	4.98	10	11.50	2.16	—[a]	$> .10$

[a] The Cochran-Cox approximation was used because of heterogeneity of sample variances.

The high abasing females did score appropriately higher on the standard Abasement scale than the low abasing females, the difference approaching significance at the .08 level of confidence. The individualized Abasement scale did not improve discrimination, and, in fact, did somewhat more poorly since the relative magnitudes of the high and low abasing groups was not even in the expected direction. However, the interaction between type of Abasement scale and differences in scale means for female high and low abasing groups did not achieve statistical significance ($t = 1.28$ for 49 *df;* $p > .20$).

There was only a limited number of control *S*s ($N = 17$), disproportionate as to sex (six males, 11 females), who took the standard EPPS in the mimeographed form as well as the published form and for whom previous semester GPA's were available. The discrepancy scores for these 17 *S*s were cut near the median, defining high and low abasing groups. The mean scores for these high and low groups on the published standard Abasement scale were 15.33 (SD = 5.04) and 12.38 (SD = 4.11), respectively, while the mean score on the individualized control Abasement scale for the high and low groups were 15.00 (SD = 4.62) and 12.24 (SD = 4.74), respectively. Although the differences in means for the high and low abasing groups were in the appropriate direction on both standard Abasement scales, neither difference was significant ($t = 1.22$ and 1.13, respectively; $df = 15$; $p > .30$). The important point to note is that essentially identical differences were obtained between the criterion groups for both Abasement scales. Thus, there is no evidence that any change in testing conditions introduced error into the testing procedure which might have served to mask an increased validity of the individualized Abasement scale following revision.

D. Discussion

The results of the Achievement and Abasement analyses did not support the contention that response to social desirability is solely a source of error on the EPPS. The standard Achievement scale correlated significantly ($r = .28$) with college academic achievement with intellectual ability partialled out, whereas the revised Achievement scale did not ($r = .07$). The standard Abasement scale reliably discriminated between high and low abasing males but in the wrong direction, and the revised Abasement scale did not improve upon this discrimination paradox. For females, high abasing subjects received higher scores on the standard Abasement scale than low abasing subjects, the difference approaching significance ($p < .08$); however, insignificant wrong-direction differences were obtained when the revised Abasement scores for these two groups were compared. Thus, further reduction of the effect of social desirability actually reduced the validity of the individualized EPPS scales relative to the standard scales; however, this could not be demonstrated statistically because of limited sample size and the low order relationships obtained with the standard scales.

One possibility suggested by the present study is that the tendency to respond in terms of the social desirability of test responses has been erroneously considered a test-taking "set" as earlier described by Cronbach. Such sets were defined as consistent tendencies to respond to item form in a specified style independent of item content. Social desirability judgments are, however, responses to content and fail in a formal sense to meet Cronbach's definition.

Further, there is reason to expect a positive, stable relationship between an individual's judged social desirability of a response and its manifest expression (i.e., its habit strength) in any interpersonal situation to the extent that rewards for "social appearances" operate as incentives. Thus, what is characteristic of a person may be in large measure determined by his social values, and the effect of improving the matching of statements for social desirability on EPPS scales would be to remove an important basis for discriminating between the relative accuracy of self-descriptive statements.

A final implication to be drawn from the present investigation is that it may prove useful to distinguish between social desirability judgments *in specific response to item content,* which may serve to enhance predictive validity, and "fake good" sets which are more *general responses to testing situations* and more likely sources of testing error. The "fake good" testing set conforms more readily to Cronbach's examples of response set, since it represents an approach to test item responding in the same way as being cautious or acquiescent would.

E. SUMMARY

This investigation tested the assumption made by Edwards in his development of the Personal Preference Schedule that response to the social desirability of objective personality questionnaire statements is a source of invalidity, a point-of-view generally consistent with earlier observations of Cronbach regarding test response sets. Predictions from the standard EPPS Achievement and Abasement scales for which only about 26 per cent of the items included pairs of statements perfectly matched for individual social desirability value were compared with predictions from individualized scales for which about 70 per cent of the items includes equally socially desirable statements. Thus there was considerably more opportunity for the college subjects to respond to differential social desirability in their endorsement of statements on the standard scales.

The results demonstrated that prediction was not enhanced by reducing the effect of social desirability; and, in fact, the standard scale predictions were generally better than those from the individualized scales, though the differences were not statistically reliable. These results were interpreted as indicating that response to the social desirability of item content on the EPPS does not represent a response set and may well be a source of test validity, whereas the "fake good" approach to testing situations would represent a response set and a more likely source of invalidity.

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A COMPARISON OF JUDGMENTAL AND ASSOCIATIONAL TECHNIQUES IN DEVELOPING VERBAL CONCEPT FORMATION MATERIALS*

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A. INTRODUCTION

Recently a number of studies have appeared (1, 2, 3, 4, 5, 6, 7) directed towards the problem of verbal concept formation. These several studies all have employed verbal material derived from a scaling study of Underwood and Richardson (6). In the Underwood and Richardson study, *S*s were presented with a list of some 213 words to which restricted associations were obtained. The restriction consisted of requiring *S* to respond to each stimulus word with a single sense impression response or association, such as, red, green, round, small, long, smooth, heavy, and so on. By summing these associations, one obtains a set of values for each word, which expresses the degree to which each word elicits a particular response category. For example, the stimulus word "tomato" elicits the category or sense impression response red in 83 per cent of the *S*s, the category soft in 7 per cent of the *S*s, and the category round in 5 per cent of the *S*s. The principal objective of this scaling was to determine the already pre-existing response potentials for these stimulus words, or more precisely their response potential for yielding sense impression responses. This, in turn, provides an estimate of the degree of "association" between these particular stimulus words and the particular response categories elicited. The critical value of having such estimates available has already been amply demonstrated by Underwood (5, 6, 7) and others (1, 2, 3, 4). Since this scaled material has been employed now in several studies, it would seem desirable to examine the response potential of these words by a different technique, and it is to this problem that the present study is directed.

Specifically, *S*s are presented with a list of words and required to judge each word for inclusion in a particular set of concepts or categories. By

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summing the number of inclusion judgments for each word for each separate category, one obtains a set of values which expresses the degree to which each word is judged as belonging to each category, which, in turn, again provides an estimate of the degree of "association" between these particular stimulus words and the particular categories. The values obtained by this judgmental technique can be compared then with the values obtained by Underwood's associational technique. We would expect to find a high degree of correlation between these two sets of values, associational and judgmental, since both are designed to reflect the degree of "connection" or "association" between a particular set of stimuli and a particular set of response categories.

B. METHOD

1. *Subjects*

One hundred *S*s from introductory psychology courses at New York University were employed in the study.

2. *Material*

The stimulus material presented to the *S*s consisted of a list of 300 words and is shown in Table 2. Of these 300 words, 213 were those employed in Underwood's scaling study (6). A new group of 87 words was added to provide scale values for a somewhat larger number of words than is available in Underwood's study.

3. *Procedure*

The *S*s were presented the 300 words in alphabetical order on mimeographed sheets during regular class periods, of 90 minutes duration, which allowed ample time for the completion of the task. The *S*s were instructed that they were to judge each word for inclusion in none, one, or more of the following six concepts: round, small, white, hard, smelly, and long. If they judged that the word belonged to one or more of the six concepts, they were to indicate this by blackening the appropriate oval or ovals on the attached mimeographed answer sheets, with six ovals present for each word, each labeled for one of the six concepts. If they judged that the word belonged to none of the six concepts, then no oval was to be blackened. By summing the number of blackened ovals then for each word-concept combination for the 100 *S*s, one obtains the per cent frequency with which each word is judged as belonging to each concept.

C. RESULTS AND DISCUSSION

In the type of judgmental task employed in this study, two basic measures are derivable. One involves an examination of the performance of individual *S*s, the other involves an analysis of individual words. Table 1 presents the results for subject performance and gives the means, medians, standard deviations, and ranges for the number of words judged for inclusion in each of the six concepts. The mean number of words judged for inclusion varies from a low of 40.3 for the concept "smelly" to a high of 77.7 for the concept "round." These mean values indicate that for any given *S*, on the average only approximately 13 to 26 per cent of the total 300 words available are judged as belonging to any one particular concept, which seems to represent a relatively low level of response to these words.

TABLE 1
MEANS, MEDIANS, STANDARD DEVIATIONS, AND RANGES FOR THE NUMBER OF WORDS JUDGED FOR INCLUSION IN THE CONCEPTS—ROUND, SMALL, WHITE, HARD, SMELLY, AND LONG ($N = 100$)

	Concepts					
	Round	Small	White	Hard	Smelly	Long
M	77.7	66.8	40.9	57.4	40.3	57.2
Md	76.0	64.0	40.5	51.5	38.0	58.0
SD	25.3	28.1	17.2	25.4	17.8	21.4
R	21–151	1–163	3–101	15–125	5–106	2–106

An analysis of individual words is presented in Table 2, which shows the response frequencies for each of the 300 words judged for inclusion in each of the six concepts. For example, the word "albino" was judged as belonging to the concept "round" by four *S*s, to the concept "small" by two *S*s, to the concept "white" by 92 *S*s, and so on. Since 100 *S*s were involved, the response frequencies are actually per cent response frequencies and therefore the values in Table 2 may be compared directly to the per cent response frequencies for these words derived by Underwood's associational technique.

The results of such a comparison are presented in Table 3, which gives both Rank-Order and Product-Moment correlations for the scale values (i.e., per cent response frequencies) obtained by Underwood's associational technique and our judgmental technique for those words for which both techniques yield scale values of 5 per cent or above. All correlations yield P-values at less than the .01 level of significance, except for the concept "long" where the P-values fall between the .05 and .01 levels. The values

TABLE 2

RESPONSE FREQUENCIES FOR 300 WORDS JUDGED FOR INCLUSION IN THE CONCEPTS—ROUND (R), SMALL (S), WHITE (W), HARD (H), SMELLY (SM), AND LONG (L) (N = 100)

	Response frequencies							*Response frequencies*					
Words	R	S	W	H	Sm	L	Words	R	S	W	H	Sm	L
1. albino	4	2	92	0	1	1	33. blush	13	4	2	2	0	4
2. alley	0	20	0	3	17	78	34. bone	16	9	40	77	2	40
3. aluminum	4	0	18	67	2	7	35. boulder	49	2	0	77	2	6
4. ammonia	0	0	5	4	95	0	36. bracelet	69	29	2	20	1	13
5. anchor	15	4	3	65	3	11	37. brass	4	2	1	85	2	4
6. ant	5	94	3	3	0	1	38. bread	23	7	55	7	20	18
7. ape	11	0	0	7	44	7	39. brick	1	10	1	98	0	8
8. apple	99	11	3	10	2	0	40. buckle	14	34	1	72	0	7
9. armor	4	0	4	97	0	1	41. building	4	7	5	45	1	39
10. ashtray	45	36	1	19	25	4	42. bulb	81	34	27	10	1	1
11. asparagus	10	3	0	1	13	74	43. bullet	37	67	2	72	4	8
12. asphalt	1	1	12	74	9	7	44. bungalow	4	66	14	6	1	7
13. atom	28	90	1	5	0	2	45. butter	9	10	8	3	24	12
14. auditorium	21	2	1	2	2	40	46. button	81	57	8	34	3	1
15. baby	23	94	8	1	9	1	47. cabbage	72	9	3	7	51	1
16. badge	38	46	4	53	0	1	48. cabin	6	62	3	21	0	7
17. balloon	93	4	0	0	1	8	49. camel	7	4	0	1	64	16
18. banana	7	6	6	2	11	79	50. canary	13	85	2	2	8	1
19. bandage	6	5	77	0	5	25	51. capsule	34	75	8	9	4	20
20. barrel	97	1	1	23	2	6	52. carrot	18	11	0	24	4	76
21. baseball	95	35	34	47	0	1	53. carousel	91	0	3	4	3	2
22. baton	10	7	5	29	0	92	54. cauliflower	55	7	41	5	39	2
23. beak	5	21	0	58	1	34	55. cave	23	13	1	21	11	38
24. bean	42	69	2	13	2	18	56. century	3	3	3	2	0	84
25. bed	1	4	27	11	1	49	57. chair	7	8	3	54	1	3
26. beet	80	31	0	8	11	1	58. chalk	24	23	83	25	2	28
27. belly	77	4	13	5	1	1	59. chamois	4	11	9	3	9	2
28. belt	21	3	1	13	0	83	60. cheese	27	14	10	10	75	4
29. bird	12	74	5	0	5	0	61. cherry	91	67	0	6	3	1
30. blackjack	10	10	0	76	2	19	62. chestnut	74	56	0	57	8	0
31. blizzard	4	3	65	12	0	16	63. chocolate	6	15	2	9	19	9
32. blood	6	3	6	5	17	3	64. cigar	39	11	0	2	64	73

TABLE 2 (*Continued*)

Words	*Response frequencies*						Words	*Response frequencies*					
	R	S	W	H	Sm	L		R	S	W	H	Sm	L
65. cigarette	34	22	46	1	26	67	99. dot	66	80	2	2	1	1
66. cinnamon	8	12	1	5	58	6	100. doughnut	100	23	3	1	18	0
67. circle	97	6	0	0	1	3	101. driveway	1	2	1	13	1	93
68. city	8	3	3	22	22	24	102. dungeon	4	19	0	31	43	17
69. clock	85	16	9	13	0	4	103. earth	37	6	1	29	15	6
70. closet	3	33	5	5	5	30	104. earthworm	24	46	0	1	10	70
71. cloud	23	9	75	0	1	7	105. eel	23	12	2	1	15	88
72. clove	8	31	3	14	47	1	106. eggshell	37	22	61	21	2	2
73. coal	30	22	0	75	5	0	107. electron	27	77	3	7	0	2
74. coconut	82	7	28	62	5	0	108. elephant	21	0	3	6	43	15
75. coffee	14	8	2	6	59	1	109. ellipse	48	3	3	4	0	20
76. collar	62	9	57	8	0	3	110. enamel	2	1	40	65	13	4
77. comma	16	52	4	4	2	13	111. epic	2	2	1	5	2	70
78. concrete	3	3	18	98	0	6	112. equator	84	1	1	1	1	27
79. cork	51	40	1	10	1	6	113. ether	5	1	8	4	75	5
80. corn	40	26	4	13	6	45	114. eye	80	55	18	1	1	1
81. cradle	19	56	11	9	2	14	115. face	64	14	10	4	1	14
82. cranberry	74	53	0	8	10	2	116. fang	4	9	24	53	2	58
83. crown	84	10	4	43	2	2	117. fingernail	9	25	13	47	2	52
84. crumb	21	86	8	8	0	2	118. fishhook	18	41	1	51	5	16
85. crystal	11	22	30	58	2	9	119. flannel	3	2	16	1	0	9
86. cucumber	38	9	3	5	4	81	120. flea	9	86	5	0	3	0
87. custard	7	5	41	0	17	4	121. flesh	0	0	33	2	14	1
88. cylinder	74	5	3	16	1	61	122. flour	1	4	89	2	5	1
89. daffodil	8	29	5	2	37	12	123. foam	2	2	82	0	5	0
90. dagger	2	3	1	64	0	75	124. forest	4	3	0	11	12	33
91. dandelion	22	37	5	1	35	2	125. formaldehyde	3	2	0	0	89	0
92. derby	84	15	0	5	1	1	126. freckle	69	83	3	1	0	0
93. diamond	20	25	29	91	1	3	127. frost	1	1	88	20	0	5
94. diaper	0	6	81	0	41	5	128. fur	3	2	10	1	12	6
95. dice	3	72	32	49	1	0	129. garbage	0	1	2	0	96	0
96. dime	81	65	12	45	2	0	130. gardenia	17	19	35	0	66	3
97. doll	12	60	10	4	1	6	131. garlic	16	20	10	4	97	1
98. dome	88	5	8	24	0	5	132. gasoline	1	2	1	2	86	0

TABLE 2 (*Continued*)

Words	*Response frequencies*					
	R	S	W	H	Sm	L
133. germ	14	82	1	1	5	4
134. ginger	3	3	2	5	56	1
135. glass	19	9	15	64	1	12
136. globe	94	4	1	15	0	3
137. gnat	9	84	0	3	1	1
138. goat	0	5	30	3	54	5
139. gorilla	4	0	1	9	43	12
140. grape	86	67	1	1	3	0
141. grapefruit	95	16	0	5	8	1
142. grass	1	7	1	0	20	45
143. grasshopper	1	58	1	4	2	23
144. gym	10	4	1	16	26	37
145. hailstone	54	47	30	60	0	3
146. hallway	0	6	1	7	4	90
147. hammer	5	3	0	94	1	11
148. harpoon	5	1	0	46	2	73
149. hatchet	2	4	0	80	0	14
150. head	81	8	2	27	1	1
151. helmet	54	1	2	82	1	1
152. history	3	0	0	3	4	70
153. hog	32	3	2	4	69	1
154. honey	1	3	5	0	34	3
155. hospital	1	3	69	6	31	17
156. icicle	9	7	56	41	1	62
157. inch	1	78	1	1	1	14
158. intestine	21	8	4	3	6	87
159. iron	1	3	1	95	1	3
160. ivory	6	1	95	50	0	7
161. ivy	2	16	4	6	9	36
162. jade	8	13	1	74	2	1
163. jar	64	18	3	16	0	13
164. jellyfish	37	34	6	1	12	5
165. jewel	25	41	5	66	0	0
166. kitten	25	82	11	1	4	0
167. knife	2	4	0	65	0	64
168. knob	85	29	2	37	1	0
169. knuckle	20	27	6	74	1	0
170. lard	2	2	29	4	45	0
171. lawn	4	2	1	1	9	39
172. lemon	71	40	0	2	25	3
173. lifetime	3	9	1	7	0	80
174. limousine	0	0	1	12	0	68
175. linen	0	1	86	0	0	6
176. lint	7	59	50	0	1	0
177. lips	38	38	4	3	2	3
178. lizard	3	28	1	6	6	66
179. manhole	89	6	0	13	8	11
180. mansion	2	1	13	12	1	33
181. manure	4	4	0	1	91	2
182. measles	48	58	2	1	3	1
183. midget	2	93	2	0	4	0
184. milk	0	2	94	2	0	0
185. mineral	1	15	2	63	4	0
186. minnow	3	76	2	1	5	5
187. moccasin	10	18	0	1	10	18
188. molecule	32	89	2	3	2	0
189. moon	92	6	24	9	0	1
190. moss	6	14	4	0	12	5
191. mouse	7	87	8	2	16	2
192. mustard	0	4	0	5	60	2
193. nails	8	14	3	73	2	47
194. napkin	0	9	79	0	0	6
195. necktie	1	6	3	2	0	82
196. needle	9	29	2	38	0	66
197. night	2	1	2	4	0	53
198. noodle	19	12	18	0	2	67
199. note	19	37	10	0	0	10
200. novel	1	4	2	2	1	67

TABLE 2 (*Continued*)

	Response frequencies							*Response frequencies*					
Words	R	S	W	H	Sm	L	Words	R	S	W	H	Sm	L
201. ocean	15	1	8	3	9	31	235. rhinestone	25	46	22	60	0	2
202. olive	82	62	0	6	16	0	236. rice	24	69	72	7	1	8
203. onion	74	29	21	10	63	0	237. ring	89	37	4	28	0	3
204. ounce	5	84	2	4	1	1	238. river	1	1	0	3	1	93
205. oyster	56	45	21	16	14	2	239. rocks	28	6	2	94	1	3
206. pail	61	6	5	26	5	5	240. rod	20	6	1	24	1	86
207. paint	0	0	17	3	66	0	241. rope	23	5	2	5	0	88
208. paper	1	2	69	2	3	12	242. ruby	42	44	1	69	1	0
209. paste	0	1	48	4	42	4	243. salt	10	33	66	11	5	1
210. pavement	3	1	12	81	2	29	244. sardine	2	45	2	0	65	20
211. peach	95	31	2	3	11	1	245. saucer	90	25	16	20	1	1
212. pear	58	30	4	7	8	4	246. sauerkraut	1	1	14	2	75	10
213. pearl	83	65	55	44	0	0	247. scissors	1	3	1	59	3	47
214. penny	93	62	1	52	1	0	248. seaweed	2	3	0	1	43	28
215. pepper	19	19	1	8	54	4	249. second	6	64	0	0	0	2
216. period	54	66	0	1	1	19	250. seed	37	85	4	14	4	3
217. pickle	29	8	0	2	43	60	251. sewer	11	1	4	2	81	22
218. picture	6	13	4	7	3	10	252. sheep	3	6	75	0	26	2
219. pill	68	81	32	15	1	2	253. shirt	2	2	62	0	2	3
220. pillow	18	11	55	2	0	5	254. silk	4	1	25	2	0	7
221. pin	21	56	0	39	1	42	255. ski	0	1	25	14	0	65
222. pine	8	4	0	11	51	25	256. skin	0	1	37	3	1	3
223. pineapple	54	6	0	15	27	9	257. skull	56	5	22	71	0	1
224. planet	82	7	1	16	0	6	258. skunk	2	18	2	0	88	1
225. platter	75	8	10	20	0	15	259. snail	33	72	2	10	8	7
226. pole	33	5	2	17	1	89	260. snake	21	8	3	3	5	89
227. pollen	22	62	1	2	29	1	261. snow	6	13	97	3	0	3
228. pony	7	45	5	2	21	1	262. spear	5	3	1	42	2	79
229. pot	77	21	2	27	4	0	263. spinach	3	2	0	3	24	13
230. powder	2	21	52	0	17	0	264. spool	85	28	1	9	0	3
231. puddle	46	25	1	0	3	5	265. stadium	47	2	1	11	1	24
232. pup	14	85	2	0	9	0	266. steel	2	0	3	99	0	6
233. rabbit	8	54	41	1	10	3	267. stone	32	21	7	96	0	0
234. rattlesnake	18	7	1	10	2	89	268. stork	3	1	51	0	3	23

TABLE 2 (*Continued*)

Words	Response frequencies						Words	Response frequencies					
	R	S	W	H	Sm	L		R	S	W	H	Sm	L
269. straw	10	10	9	1	9	64	285. tree	15	4	2	29	3	54
270. sugar	7	19	68	6	7	0	286. tunnel	20	2	1	6	6	90
271. sulphur	5	3	8	2	78	2	287. turpentine	0	3	3	2	83	1
272. sun	84	0	9	4	1	2	288. tweezer	1	42	0	30	1	20
273. sword	1	0	1	62	1	80	289. uniform	2	0	41	3	3	3
274. symphony	8	1	2	2	1	45	290. velvet	4	4	11	1	0	5
275. tablecloth	3	2	66	0	0	20	291. village	3	61	1	1	4	7
276. tack	25	62	1	59	1	4	292. vinegar	3	1	4	0	84	1
277. tar	2	2	2	10	53	3	293. waist	50	58	1	2	3	6
278. teeth	2	20	85	63	1	3	294. walrus	12	0	5	3	20	14
279. telephone	6	8	2	22	1	23	295. water	7	0	12	7	0	11
280. tentacle	10	5	0	2	2	75	296. whale	18	1	6	4	10	45
281. thimble	46	78	2	25	2	0	297. wheel	90	2	1	16	1	2
282. tobacco	1	4	0	1	76	4	298. wood	6	1	1	65	1	15
283. tomato	88	29	0	2	6	6	299. world	80	4	0	6	1	6
284. tongue	5	7	0	3	2	69	300. zoo	4	0	0	3	67	5

of these correlations would seem to indicate that a moderately high degree of correspondence exists between the associational and judgmental techniques in assessing the response potential of these words to evoke these particular concepts. There are, however, certain additional factors which must be taken into account in evaluating these correlations.

TABLE 3
RANK-ORDER (RHO) AND PRODUCT-MOMENT (R) CORRELATIONS FOR SCALE VALUES (I.E., RESPONSE FREQUENCIES) DERIVED BY THE ASSOCIATIONAL AND JUDGMENTAL TECHNIQUES, FOR THE CONCEPTS—ROUND, SMALL, WHITE, HARD, SMELLY, AND LONG

	Concepts					
	Round	Small	White	Hard	Smelly	Long
rho	.66	.68	.80	.57	.75	.52
r	.60	.67	.80	.54	.72	.49
Number of words	58	53	43	33	34	24

First, as shown in Table 3, the number of words for which the associational technique yields scale values varies from a high of 58 words for the concept "round" to a low of 24 words for the concept "long." For example, with the concept "round," only 58 of the 213 words employed in Underwood's study yielded scale values of 5 per cent or more, i.e., only 58 words evoked the sense impression "round" in 5 per cent or more of the *S*s. (Underwood does not give scale values of less than 5 per cent.) In contrast, the judgmental technique yields scale values of 5 per cent or more on 142 of the 213 words. These 142 words represent the 58 words for which both techniques yielded scale values, plus 84 words for which the associational technique yielded no scale values (or more precisely no scale values are given by Underwood as the values were in the range from 0 to 4 per cent, and which we shall treat as if no scale value were given). The judgmental scale values for these 84 words range from 5 per cent to as high as 80 per cent for the word "beet," with 32 of the 84 words exceeding a scale value of as high as 20 per cent. Similar results also hold for the other five concepts. For example, with the concept "long," 91 words with scale values ranging from 5 per cent to 75 per cent occur with the judgmental technique, for which no scale values exist with the associational technique. Thus, in a certain sense, the values of the correlations shown in Table 3 are highly inflated, as we did not include any of the words for which scale values exist (5 per cent or above) with the judgmental technique but not with the associational technique. Such words were not included intentionally, as it seemed more reasonable to determine the relationship between the two techniques on words for which both techniques yielded scale values and then to temper this relationship with the fact that a significant number of words exist, for which only the judgmental technique yields scale values of 5 per cent or above. In addition, had the full set of words been employed, the resulting correlations would have been very low and insignificant, thus hiding the relationship which does seem to exist for those words where both techniques yield scale values.

In further evaluating the degree of correspondence between the two techniques, associational and judgmental, it is relevant to consider the absolute scale values of the words as determined by the two techniques. For example, with the concept "round," for the 58 words for which both techniques yield scale values, the range of values for the associational technique is from 5 to 95, with a mean scale value of 27.8, while for the judgmental technique, the range of values is from 18 to 100, with a mean scale value of 67.4. The corresponding mean scale values for the associational and judgmental techniques for the remaining five concepts are as follows: small (27.5 vs 57.7), white (32.7 vs 49.4), hard (18.2 vs 58.9), smelly (37.9 vs 65.6), and long (20.4 vs 71.8). All of these differences between the mean scale values given by the two techniques are all quite large and an examination of the scale values for each individual word also reveals, almost without exception, higher scale values occurring with the judgmental technique, than with the associational technique. It seems safe to conclude, therefore, that while the correlations between the two sets of scale values yielded by the two techniques for these particular words are relatively high, there is an appreciable and significant difference in the absolute magnitude of the two sets of values. This shift in the absolute magnitude towards higher scale values, found with the judgmental technique, possibly helps to explain the large proportion of words that yield a scale value of 5 per cent or above with this technique, but yields no scale values with the associational technique. That is, with the judgmental technique, the whole range of scale values is shifted towards the high end of the response frequency continuum, thus allowing more words to take on values at the low end of the continuum, than is possible with the associational technique.

This basic difference between the absolute magnitude of the scale values found with the two techniques, reflects we believe, the different operations employed by these techniques to assess or measure the response potential of these words to evoke particular concepts. Specifically, in the associational technique, *S*s are required to give a *single* sense impression response or concept, while in the judgmental technique, their response is not restricted to a single concept, but may include as many concepts as are presented to them. That is, with the associational technique, we presumably are measuring the single most dominant response in the response hierarchy, while with the judgmental technique, we are tapping as much of the hierarchy as our set of response categories or concepts permit us to tap. For example, the word "beet," with the associational technique, yields a single sense impression response or concept, namely "red," with a scale value of 87, while the word "beet," with the judgmental technique, yields appreciable scale values of 80 and 31 for the concepts "round" and "small," respectively. No value for the concept "red" is available for "beet" with the judgmental technique, since "red" was not one of the concepts for which the words were to be judged. If "red" had been one of the concepts, we would expect to find a very high scale value comparable to the value of 87, found with the associational technique. In a somewhat analogous manner, if the associational technique required *S*s to give not only their first sense impression to "beet," but a series of sense impressions or associations, we would expect to find appreciable values for the concepts "round" and "small" with this technique as well.

The preceding analysis suggests certain advantages and disadvantages associated with the two techniques. The associational technique permits us to measure the strength of the single most dominant response or concept, but does not always allow us to measure very precisely the strength of secondary responses in the response hierarchy. It is true that a great many of the words with the associational technique do yield scale values for more than a single concept, in contrast to "beet," and one might assume that these values reflect estimates of secondary response potentials in the response hierarchy, but these values still basically represent the single most dominant response for those *S*s who gave them. In contrast, the judgmental technique probably permits us to make better estimates of both the most dominant and secondary responses in the response hierarchy, but only with respect to the particular concepts employed in the judgment task. Since the final concern of both techniques is to provide a set of verbal stimuli to which the already existing response hierarchies are known, at least to some degree, estimates of this response hierarchy which reflect the values obtained by *both* techniques are probably sounder, than estimates based on either one alone. In addition, values obtained by having *S*s give not only their first sense impression or association, but a series of such associations, should certainly be developed and compared with the values presently available. Finally, the problem of the "validation" of the various scaling techniques must be examined in terms of differential predictions as to their effects in an experimental context.

D. SUMMARY

Underwood has recently developed a set of scaled verbal stimuli, for use in verbal concept formation studies, by employing an associational technique, which provides an estimate of the degree of association between a particular set of stimulus words and a particular set of response categories. The present study employs a judgmental technique in making such estimates and compares these estimates or scale values with those obtained by Underwood's associational technique. The results suggest that while the two techniques yield somewhat similar scale values, the best estimate of the degree of association between stimuli and response categories should reflect values obtained by both techniques, rather than either one alone.

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A SIMPLE METHOD FOR FITTING PSYCHOPHYSICAL POWER FUNCTIONS*

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A. Introduction

The relation between intensity of stimulation and the intensity of the corresponding subjective response is usually adequately described by a power function. This has been convincingly demonstrated for about 20 perceptual continua, especially by Stevens and his co-workers (5, 6, 7).

The psychophysical power function may be written in the form

$$R = c(S - a)^n, \tag{1}$$

where c is related to the arbitrary unit of measurement, a is a constant which may be related to the absolute threshold, and the exponent n is the main characteristic of the function. The parameter a was probably first introduced in some studies from this laboratory (1). It is usually small but in some cases definitely not negligible.

If a approximates 0, the fitting of a power function is a simple matter, involving the fitting of a straight line to a log-log plot. If a is not negligible, an iterative least squares solution is possible, but this is a rather time-consuming procedure. The purpose of the present paper is to describe a very simple method which combines graphic and algebraic procedures.

B. Derivation of Equations

The subjective intensity R which corresponds to the stimulus value S is given by Equation 1. Consider a second subjective intensity $R_p = pR$, where p denotes any fraction or multiple. This subjective intensity is evoked by the stimulus intensity S_p. Then we have

$$pR = c(S_p - a)^n. \tag{2}$$

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Combining Equations 1 and 2,

$$p = \left(\frac{S_p - a}{S - a}\right)^n,$$

and solving for S_p we obtain the equation

$$S_p = a(1 - p^{1/n}) + p^{1/n}S. \quad (3)$$

If p is constant, then $p^{1/n}$ and $a(1 - p^{1/n})$ are constant. If they are replaced by the symbols B and A, respectively, we may rewrite Equation (3) in the simple form

$$S_p = A + BS. \quad (4)$$

It is thus seen that S_p is a linear function of S, if R is a power function of S. The constants of the power function may be computed from the two constants of the linear Equation 4. By definition

$$a(1 - B) = A$$

and

$$p^{1/n} = B.$$

Solving for a and n, respectively, we obtain the computational formulae

$$a = \frac{A}{1 - B} \quad (5)$$

and

$$n = \frac{\log p}{\log B}. \quad (6)$$

The curve-fitting procedure thus starts with plotting S_p against S. If this plot is linear, it follows that R is a power function of S, and the constants a and n of this function may be computed by Formulae 5 and 6 from the constants A and B of the linear plot. This method was first developed by the present writer (1) for treatment of data obtained by ratio production methods in which p is constant in the experimental situation. In these methods the subject is often instructed to adjust a variable simulus so that it appears subjectively half as intense as the standard stimulus ($p = 0.5$). Any other ratio may be used, but in these methods the ratio is kept constant throughout the experiment.

The same simple procedure may, however, easily be extended to any set of subjective scale values R plotted against stimulus values S, regardless of how the subjective scale was established, provided only that it is on the ratio level. This generalization is made possible by graphic interpolation of values corresponding to the constant p required by the method. The procedure will be illustrated by an experimental example.

C. An Experimental Illustration

Results from an experiment by Ekman, Eisler, and Künnapas (3) concerning the photopic brightness of monochromatic light of wave length 649 mμ are shown in Figure 1A. These data have been chosen for the illustration because they represent a case where the constant a of the power function cannot be neglected; it may be regarded as an extrapolated value of the absolute photopic threshold (3). The circles represent experimental values, which in this experiment were obtained by means of a method of magnitude estimation.

The steps in fitting the power function are as follows:

1. A smooth curve is drawn through the points of the graph. This curve serves the purpose of interpolation, and irregularities in the drawing will merely somewhat increase the scatter in a subsequent linear plot. Even linear interpolations are possible.

2. The constant p is given an arbitrary value which may conveniently be chosen so that the difference between S_p and S is of the same order of magnitude as the interval between successive experimental stimulus values (see below). Within wide limits the choice of value of p is not critical. The value of p chosen for this illustration is 0.8.

3. A set of values S is chosen for examination. Since the method is based on interpolation, any S values within the experimental range may be used, e.g., 1, 2, 3, etc. For the present illustration the stimulus values which were actually used in the experiment have been chosen. They are shown in the first column of Table 1.

4. For each value of S the corresponding value of R is found from the graph in Figure 1A. One example is shown in the graph: for $S = 7.2$ the corresponding $R = 16.3$. The values of R are seen in the second column of Table 1.

TABLE 1

S	R	$0.8R$	$S_{0.8}$
0.7	4.4	3.5	0.6
1.2	7.2	5.8	0.9
1.7	9.3	7.4	1.2
2.7	11.4	9.1	1.7
4.1	13.2	10.6	2.3
7.2	16.3	13.0	3.9
10.1	18.2	14.6	5.3

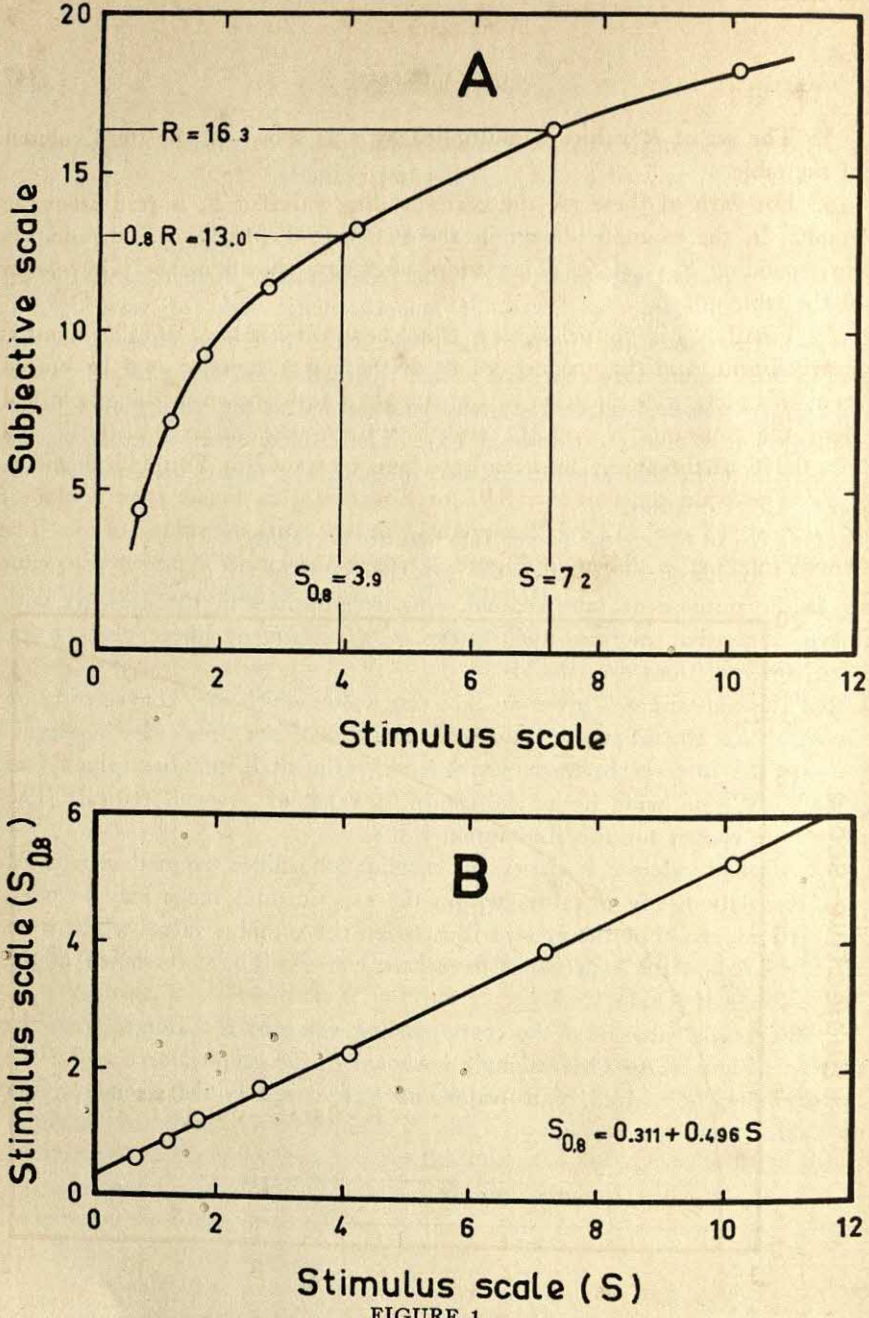

FIGURE 1

Diagram *A* shows scale values for photopic brightness of wave length 649 mμ, obtained by a method of magnitude estimation and plotted against the physical stimulus values. A smooth curve has been drawn through the points of the graph. From this curve certain values are interpolated (see text). Diagram *B* shows the interpolated values S_p plotted against the corresponding experimental stimulus values S. From the constants of the straight line in Diagram *B*, the constants of a power function fitted to the data of Diagram *A* may be computed (see text).

5. The set of R values is multiplied by p as shown in the third column of the table.

6. For each of these pR the corresponding value of S_p is read from the graph. In the example shown in the graph $(0.8)(16.3) = 13.0$, and the corresponding $S_{0.8} = 3.9$. The values of S_p are shown in the last column of the table.

7. Finally S_p is plotted against S as shown in Figure 1B. The trend is clearly linear, and the goodness of fit of the power function may be judged from this plot. The equation of the straight line is shown in the graph, and from the constants $A = 0.311$ and $B = 0.496$ the values $a = 0.617$ and $n = 0.318$ of the power function have been computed by Formulae 5 and 6.

8. The scale constant $c = 8.97$ of Equation 1 is found from a plot of R against $(S - 0.617)^{0.318}$ computed for the various values of S. The power function is shown in Figure 2, where the circles represent the same

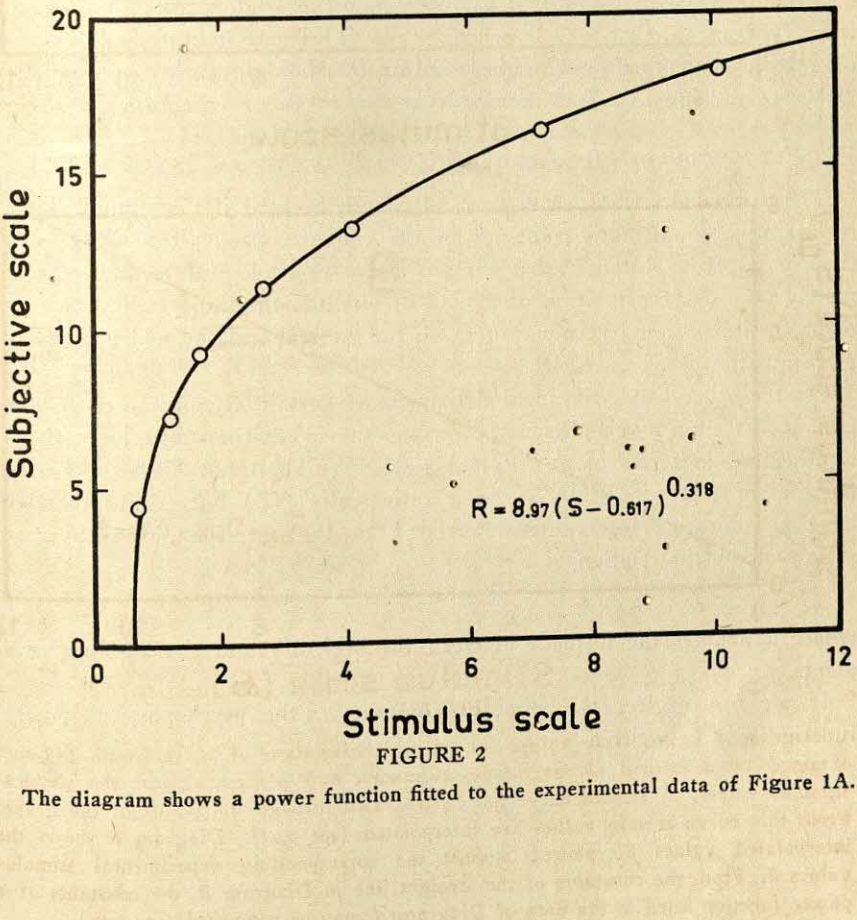

FIGURE 2

The diagram shows a power function fitted to the experimental data of Figure 1A.

experimental values as in Figure 1A. The fit of the function is good, as can be judged already from Figure 1B.

The procedure described here was used in a recent investigation of the photopic brightness of monochromatic light of several wave lengths (4), where the method of magnitude production was used. The illustration of this paper has been taken from a previous study by the method of magnitude estimation (3). The same procedure may be applied in certain cases of shifting functions, which have been discussed by the present writer in connection with ratio production methods (1); the formulae derived in the previous paper may then be used in connection with the graphic procedure described above.

The constant a of the power function has been discussed in a previous paper by the present writer (2). It may be closely related to the absolute threshold as it appears to be in the example shown above. In some cases, however, a negative value of a has been found in studies from this laboratory. This means that $R > 0$, when $S = 0$. This may indicate the presence of a basic perceptual noise. The absolute threshold in such a case would rather correspond to a just noticeable increment (above the basic noise).

D. ESTIMATION OF THE ABSOLUTE ZERO POINT OF AN INTERVAL SCALE

The method described above may, of course, be used if the stimulus scale is lacking absolute zero point, as in the common temperature scales. In these cases the constant a has no particular psychological significance; it merely indicates the position of a kind of absolute threshold or indifference point (as in the case of temperature) on the interval scale by which intensity of stimulation is measured.

On the other hand, the method may under certain circumstances also be used for fitting a psychophysical power function when the subjective variable is measured in terms of an interval scale. We shall not discuss here the question of "category scales" versus "ratio scales" (7) but assume that we have a subjective interval scale related to the corresponding subjective ratio scale by the relation

$$R' + \alpha = R, \tag{7}$$

where α denotes the distance between the arbitrary and the absolute zero points.

If we can neglect the stimulus constant a, the psychophysical power function may be written

$$R' + \alpha = cS^n. \tag{8}$$

In the case of another stimulus value qS, where q denotes any fraction or multiple, we have the corresponding subjective value

$$R'_q + \alpha = c(qS)^n. \tag{9}$$

Combining Equations 8 and 9 and proceeding as above we obtain the linear equation

$$R'_q = C + DR', \tag{10}$$

where $C = \alpha(D - 1)$ and $D = q^n$. The computational formulae are given by

$$\alpha = \frac{C}{D - 1} \tag{11}$$

and

$$n = \frac{\log D}{\log q}. \tag{12}$$

The graphic procedure is the same as described above, except that the constant q is applied to the stimulus continuum so that a plot of R_q against R is obtained (instead of S_p against S). From the constants of the straight line fitted to this plot, the constants of the power function are computed by Formulae 11 and 12. By adding α to R' we transform the subjective interval scale into a ratio scale.

The application to subjective interval scales briefly discussed here may be of some interest especially in animal experimentation. "Subjective"—or underlying—variables cannot be measured in animals by means of any "direct" methods. The "indirect" methods (pair comparisons and related methods), on the other hand, in general yield measures on the interval level. The general comparability of "direct" and "indirect" methods is meanwhile being studied on the human level in a series of investigations in this laboratory.

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THE VARIATION OF FLICKER-FUSION THRESHOLDS AMONG GROUPS OF HOSPITALIZED PSYCHIATRIC PATIENTS*

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A. INTRODUCTION

That point at which an intermittently illuminated test patch ceases to appear as a flickering light and changes in appearance to that of a steady light (the frequency having been increased gradually) has been termed the critical frequency of fusion. Conversely, the point of change in appearance from steady to flicker (frequency has been decreased) has been termed the critical frequency of flicker. Each is usually measured in terms of cycles per second. The average of the two, i.e., the measure in general usage, has been called the critical flicker-fusion frequency or, more simply, the flicker-fusion threshold (CFF).

Landis (6) has surveyed the literature dealing with the physical aspects of the light stimulus, and Landis (6) and Simonson and Brozek (14) have also summarized those variables which relate to the physiological and psychological characteristics of the observer.

Mahneke (12) has shown the importance of the method of stimulus presentation. Dillon (2), having analyzed CFF data obtained from normal controls and patients, demonstrated that differences between ascending and descending CFF thresholds (as well as the ascending thresholds *per se*) differentiated the patients from a group of normal controls.

In recent years, the CFF threshold has come into widespread usage in clinical medicine and psychiatry. The CFF threshold is a useful clinical measure since it has been shown to be a relatively stable indicator which is sensitive to various types of pathologic disturbances and to certain emotional

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conditions. For example, CFF has been shown to be of diagnostic value in toxemia of pregnancy (1) and in hypertension or coronary arterial disease (5). It has also been shown that CFF is lowered with increased anxiety (3), and is higher in persons of the extrovert personality type (15, 16). Whether or not CFF relates to psychopathological conditions is a matter of debate (4, 13).

CFF has also been found to be altered by various forms of psychiatric therapy. Brain surgery (7, 17), electroconvulsive therapy (8), and insulin-coma treatment (9) have been shown to bring about a lowering of the CFF threshold. In each of these investigations, it was pointed out that CFF might be an indicator of brain damage and hence could be used as an index of the efficiency of the central nervous system.

It was also noted that the CFF threshold varied inversely but not significantly with outcome (rated as 1, 2, or 3) in three of these investigations. In the Landis and Clausen investigation (7), the patients rated as much improved registered lower Pre-treatment CFF thresholds than patients rated as improved, and the improved patients had lower thresholds than those rated as unimproved. This regularity was not obtained in the two subsequent investigations (8, 9), but the much improved patients still registered lower CFF thresholds than did the improved and unimproved patients. A relationship between CFF and diagnosis (not significant) was also noted by Landis and Clausen.

B. Purpose

Since the initial CFF thresholds seemed to relate to outcome of therapy in successive investigations (statistical significance was never attained) the author decided to combine the data from all these investigations and reanalyze the results obtained in order to determine the possibility of employing these CFF thresholds as prognostic indicators. In addition, the author also wished to determine the significance of the relationships of CFF to such variables as age, sex, and diagnosis in a large population of hospitalized psychiatric patients.

C. Apparatus and Procedure

The CFF thresholds were obtained in six different investigations, the results of which have been reported in five earlier publications (7, 8, 9, 11, 17). The results of the sixth investigation (10) in which four phenothiazine derivatives were studied have not been reported previously.

The treatments investigated, then, were: Brain surgery (OP), electro-convulsive therapy (ECT), insulin coma therapy (ICT), and drug therapy (DRUG). Four phenothiazine derivatives were included in this drug group: thorazine, compazine, sparine, and vesprin. Data from a control group (psychotherapy and/or routine hospital care—CON) were also available for comparison.

In each investigation, the methodology was the same: the patient served as his own control. CFF thresholds were obtained before treatment was begun, during a prescribed course of treatment and after treatment was terminated (Pre-, During-, and Post-treatment sessions). The apparatus employed and the specific psychophysical methodology have been described in the previous reports. The apparatus employed in investigating the phenothiazines was the same as that in the investigation of the effects of ECT, but a higher level of test-patch luminance was used.

Since the experimental conditions varied from one investigation to another, direct comparisons among the investigations were impossible. Accordingly, the CFF scores obtained in each investigation were transformed to a common basis by means of the Z transform. Thus, the six distributions of CFF scores were transformed to new distributions, the means and standard deviations of which were 50 and 10 respectively.

In the original investigations, the somatic treatments (ECT, ICT, and OP) were found to depress CFF thresholds. In order that this depression (or lack thereof in some patients) not be lost artificially, all transformations were carried out by computing the transform equation for Pre-treatment scores, and then applying these equations to the During- and Post-treatment scores. In this way, any changes in threshold as a result of the treatment would still be in evidence, and in proportion to the original amount of change, the proportion depending upon the constants in the Z transform equation.

In this final analysis, then, three Z scores were computed for each patient, provided only that the patient had been tested on all three occasions. These were the Pre-treatment (Pre) score, the first During-treatment (DUR) score, and the last Post-treatment (Post) score. Because of such events as early discharge, death, confounding of treatments, equipment failure, etc., the number of patients varied among the Pre, During, and Post sessions.

There were thus three different comparisons to be made among each patient's scores. The changes between the Pre and DUR sessions, between the During and Post sessions and between the Pre and Post sessions were computed. The direction of computation (for algebraic sign) was such that a positive change (+) indicates a gain (improved performance) and a negative change (—) indicates loss (poorer performance). The computations, then, were in these directions: During *minus* Pre, Post *minus* During, and Post *minus* Pre.

The Z scores *per se* and the changes in score were then classified according to a five variable schema, with treatment, age, sex, diagnosis, and outcome as the variables. Each variable was grouped as follows:

1. Five treatments: DRUG; CON; ECT; ICT; OP.
2. Three age ranges: 16-25; 26-45; 46 and older.
3. Sex.
4. Three diagnostic categories: Dementia praecox paranoid (P)—the largest single schizophrenic sub-group; dementia praecox (DP)—other than paranoid; and depressed (D)—all patients whose major symptom at the time of admission was depression.
5. Three outcome ratings: (*a*) Much Improved-Patients exhibiting marked improvement. Most rated as such were later admitted to convalescent care status or discharged outright. (*b*) Improved-Patients exhibiting some or noticeable improvement. A very few were later placed on convalescent care status. (*c*) Unimproved-Patients showing no noticeable improvement or, in some cases, becoming worse.

When the author decided to attempt this reanalysis, a five-way analysis of variance was deemed to be the appropriate statistical tool, since some preliminary computations had pointed to the possible importance of the first and second order interactions. When the overall analysis was set up, it was found that even a three-way analysis was impossible since the number of entries per cell were not only not comparable but not even proportional. In fact, some cells were without entries. Because of this, the analysis, as here presented, comprised a series of one-way analyses of variance, i.e., each variable was analyzed separately. Since the multivariate analysis could not be done, the interaction effects could not be assessed properly.

D. RESULTS

In order to determine the representativeness of the patient population tested in this report, the 250 patients from whom pre-treatment CFF data were obtained were grouped according to the five variables. The first order interactions were then determined and the χ^2 values computed and applied in contingency tables. These values are depicted in Table 1.

The relationships of age and diagnosis, age and treatment, treatment and diagnosis, treatment and outcome, and diagnosis and outcome parallel the

TABLE 1

χ^2 VALUES APPLIED TO FIRST ORDER INTERACTIONS OF THE TREATMENT, AGE, SEX, DIAGNOSIS AND OUTCOME VARIABLES IN CONTINGENCY TABLES (*$p < .001$, **$p < .01$)

	Age	Sex	Diagnosis	Outcome
Treatment	59.8*	5.8	35.0*	43.6*
Age		4.1	69.9*	9.1
Sex			2.6	4.5
Diagnosis				15.4**

results of population studies of the psychiatric hospitals. In brief, this population analysis demonstrated three things:

1. Depression and "old" age were associated. Both depressed and older patients tended to be treated with ECT or DRUG.

2. Younger patients and DP were associated, and tended to be treated with ICT.

3. Patients treated with ECT (especially the depressed) showed the highest degree of improvement, while the CON group registered the lowest degree of improvement.

The CFF data are summarized in Table 2. The number of patients, means, and standard deviations are tabulated according to the test session for each of the five variables.

Reliability coefficients were not as high as those usually obtained. Some form of treatment intervened between the pre- and during-sessions, and, of course, was withdrawn between the during- and post-sessions. In spite of this intervention, however, the CFF is still quite reliable. The pre-during correlation (Pearson) was +0.67. That for the during-post comparison was +0.61 and for the pre-post comparison, +0.60.

Three one-way analyses of variance (one per test session) were performed—testing each of the main variables separately. Sex, diagnosis, and outcome failed to reach the .05 level of significance, and may be considered to exert no effect upon the scores—at any of the three sessions. The treatment variable had a significant effect ($p < .05$) in that the CFF values for patients treated somatically (ECT, ICT, OP) were lower than the values for the other two groups when the During scores were analyzed. ICT, ECT, and OP did not differ among themselves. Treatment was not significant for the Pre and Post sessions, i.e., there were no initial differences which could be associated with the selection for a given treatment, and no residual (Post) differences following treatment.

The age variable was highly significant before ($p < .05$), and during and after ($p < .01$) treatment. Since CFF and age are inversely correlated and this finding is confirmatory (r = —.23), the fact that the significance remains, not only while treatment is in progress (r = —.27) but also after termination (r = —.22), indicates that treatment does not serve to overcome the differential effects of age.

For all three sessions, females were consistently (but not significantly) lower than males. The depressed patients also showed lower CFF thresholds than those in the other two diagnostic categories, before treatment, but again the difference was not large enough to attain significance.

Finally, the differences in thresholds among the three outcome groupings were so slight that further comment is unnecessary.

TABLE 2

The numbers of patients and means and standard deviations of CFF thresholds according to treatment, age, sex, diagnosis, and outcome. Pre, During, and Post are the particular sessions, i.e., before, during, and after treatment. Values are in Z score units and may be considered in terms of CPS.

1.	*Treatment*	DRUG	CON	ICT	ECT	OP
Pre	N	29	39	60	76	46
	x̄	51.38	48.82	50.38	49.61	50.69
	SD	8.08	11.06	10.27	9.75	9.72
Dur	N	29	37	60	76	31
	x̄	49.10	47.88	44.63	45.25	43.10
	SD	9.14	9.01	10.58	11.02	9.87
Post	N	16	32	38	65	29
	x̄	46.63	50.02	51.96	51.32	49.66
	SD	6.99	10.09	10.57	8.95	8.50

2.	*Age*	16-25	26-45	46+	3. *Sex*	M	F
Pre	N	69	121	60		138	112
	x̄	52.55	49.87	47.65		51.04	48.90
	SD	11.18	9.05	9.34		9.76	9.91
Dur	N	65	114	54		129	104
	x̄	48.84	45.34	42.69		46.47	44.75
	SD	10.55	9.81	10.16		10.01	10.66
Post	N	46	90	44		109	71
	x̄	54.21	49.85	48.13		51.39	49.23
	SD	11.05	8.62	7.43		9.33	9.24

4.	*Diagnosis*	P	DP	D	5. *Outcome*	1	2	3
Pre	N	74	130	46		85	90	75
	x̄	50.59	50.76	47.32		49.46	50.38	50.44
	SD	8.10	10.61	10.04		9.29	9.92	10.39
Dur	N	69	118	46		82	84	67
	x̄	45.35	46.41	44.59		45.58	44.82	46.95
	SD	10.72	9.45	11.02		10.33	10.33	12.27
Post	N	56	88	36		69	57	54
	x̄	49.82	51.73	48.74		50.83	50.34	50.38
	SD	8.12	10.14	8.75		8.17	9.05	10.93

The effects of treatment upon CFF and the recovery from the effects of treatment may be seen in the Pre:Dur and Dur:Post comparisons, respectively. The Pre:Post comparison reflects the effects of practice in combination with treatment effects. With this in mind, the CON group may be considered separately. Since no physical or pharmacological treatment intervened among the sessions, any changes in CFF thresholds may be attributed to the effects of practice, or to random fluctuation.

These comparisons were also subjected to a number of analyses of variance. Significant differences were found only among the treatments. Age, sex, diagnosis, and outcome did not affect the changes in CFF thresholds in any way. Both Pre:Dur and Dur:Post comparisons varied according to treatment ($p < .01$). The greater loss brought about by the somatic therapies and the greater subsequent recovery from the effects of these therapies (in terms of threshold change) were thus demonstrated. The Pre-Post comparison failed to reveal significant differences which could be associated with any of the five variables.

E. Discussion

The present analysis attempted to answer several questions:

1. Are hospitalized psychiatric patients differentiated in terms of age, sex, diagnosis, or prognosis by their CFF thresholds obtained shortly after admission to a hospital and before any form of psychiatric treatment has begun?

2. If the CFF thresholds are obtained while treatment is in progress and/or after treatment is terminated, are they differentially influenced by the form of treatment? Do these "during" and "after" CFF thresholds reflect age, sex, diagnosis, or outcome of therapy?

3. Do the changes in CFF thresholds resulting from treatment vary according to the type of treatment, outcome of treatment, diagnosis, age, or sex?

The pre-treatment CFF thresholds reflected (significantly) age differences only. Sex and diagnostic differences, while seemingly pronounced, failed to attain significance when analysis of variance was applied. There were no differences in threshold which one might utilize to predict outcome of therapy or the future disposition of the patients.

The during- and post-treatment CFF thresholds again revealed age differences. The during scores also reflected the effects of treatment in that the thresholds for the somatic groups were lower than those of the patients in either CON or DRUG groups. These differences disappeared when CFF thresholds were obtained after treatment was terminated.

The changes in CFF thresholds also reflected the differential effects of the treatments. The (Pre-Dur) comparisons revealed that there was no significant change for the DRUG and CON and a significant decrement induced by the somatic therapies. There were no differences, however, among the three somatic therapies in the amount of decrement produced. The Post-During comparisons which, in effect, reflect the extent of recovery from the effects of treatment were the same as the Pre-During comparisons. There were no significant changes for the patients treated with drugs or control therapy but the somatic group showed a significant gain. In other words, only those patients treated with ICT, ECT, or OP suffered a loss in thresholds, from which they recovered after treatment was stopped. The Pre-Post comparisons revealed no significant changes. This finding plus the very small change shown by the CON group would tend to demonstrate the relative freedom of CFF measures from the effects of practice. None of the changes were related to age, sex, diagnosis, or outcome.

There are two possible explanations for the lack of significant effects of diagnosis and outcome upon the pre-treatment thresholds. The first possibility is that the interactions of age, diagnosis, and outcome are such that the effects of diagnosis and outcome, which would be less pronounced than the effects of age, were obscured. Unfortunately, the interaction effects could not be assessed properly.

In a previous analysis (2), the author demonstrated that outcome was associated with a difference between ascending and descending CFF thresholds in that there was a greater difference in the direction of ascending *minus* descending for patients showing little or no clinical improvement than for patients who showed a considerable amount of improvement. In view of this, it would seem that if one wishes to test the CFF thresholds prognostically, one should utilize both ascending and descending methods of limits in obtaining these CFF thresholds.

F. SUMMARY

Flicker-fusion thresholds had been obtained from hospitalized psychiatric patients in previous investigations. These values have been subjected to further analysis and examined for their relationship to the "vital" variables of treatment, age, sex, diagnosis, and outcome of treatment. The changes in these values among the pre-, during- and post-treatment sessions were also analyzed for these same relationships. The results of this analysis are these:

1. The pre-CFF scores were inversely related to age. This relationship remained significant while treatment was in progress and after treatment was terminated. The treatments were differentiated by the during treatment CFF values in that patients treated with ECT, ICT, and OP showed lower thresholds than those treated with drugs, psychotherapy, or routine hospital care. No other main variable proved to have a significant effect.

2. The changes in CFF thresholds from one session to another reflected nothing other than the effects of treatment. The ECT, ICT, and OP therapies were shown to produce a large significant drop in CFF; the other therapies did not.

3. The CFF thresholds failed as diagnostic and prognostic indicators when such thresholds were obtained upon admission to the hospital.

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RESISTANCE TO EXTINCTION AND NUMBER OF WEAK-LIGHT REINFORCEMENTS*

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A. INTRODUCTION

Many experiments have shown that rats can learn to press a lever with no other reward than the onset of a dim light. Apparently, however, there are circumstances under which light onset is not reinforcing. Of three experiments recently performed in this laboratory (1, 5), only one found clear evidence for learning. In that study (1, Experiment II), training was terminated after an average of 19.5 flashes had been given, while averages of 52 and 65.5 flashes were presented in the experiments yielding negative results. Perhaps the optimum number of reinforcements in a single session is quite small, with further presentations of light actually tending to produce extinction. The present experiment was planned to test this supposition.

B. METHOD

1. *Subjects*

*S*s were 114 male Holtzman albino rats, approximately 70 days old and housed two per cage with food and water always available. They were assigned randomly to three experimental and three control groups of 19 *S*s each.

2. *Apparatus*

The apparatus consisted of two wire-mesh Skinner boxes similar to the *S*s' living cages. The boxes were 9 in. wide by 14 in. long by 7 in. high and were shielded from sound and light by large Fiberglas-lined Masonite covers. The reinforcing light was a 6-w., 115-v. clear glass pilot lamp. It was mounted outside the cage, 6 in. above the 5 in. high, 3¾ in. wide sheet steel lever. Bar presses were recorded on magnetic counters.

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3. *Procedure*

Each experimental *S* was given a single training period in a Skinner box. Following a 5-min. habituation period in the dark, each lever press turned on the light for one second, regardless of the duration of the press. Some *S*s received 10 light flashes, others, 30, and still others received 90 flashes. Paired with each experimental *S* was a yoked-box control *S*, which received the light each time its experimental partner pressed the bar. Responses by control animals were recorded but were otherwise without effect. As soon as the experimental *S* had received the designated number of flashes, both *S*s were removed from the Skinner boxes. Whenever an experimental animal failed to press the specified number of times within 60 minutes, it and its control *S* were removed from the boxes but were not discarded from the experiment.

On the second day, *S* was returned to the Skinner box for 15 minutes and its bar-presses were recorded, but the light was not presented. This session, therefore, constituted an extinction period for any *S*s that had learned to press the bar.

C. RESULTS

For each number of reinforcements, the effect of the training was assessed by comparing the experimental and control groups on the day following lever training. Table 1 shows the mean number of responses made by each group on the extinction day, as well as the results of *t* tests between experimental and control groups. Since only differences favoring the experimental groups were of interest, the *p* values are unidirectional.

TABLE 1
BAR PRESSING ON DAY FOLLOWING LEVER TRAINING BY GROUPS HAVING RECEIVED 10, 30, AND UP TO 90 WEAK-LIGHT REINFORCEMENTS

	Group		
	10	30	90
Mean (Exper. group)	34.84	29.68	24.36
Mean (Cont. group)	27.42	26.26	22.41
Mean difference	7.42	3.42	1.95
S.E. of difference	4.24	3.95	3.67
t	1.75	0.87	0.54
p (one sided)	.05	.20	.30

For each of the three conditions, the experimental *S*s responded more than did the controls. However, the experimental-control difference was greatest for the 10 reinforcement condition and least for 90 reinforcements. Only for 10 reinforcements was there a statistically significant difference between experimental and control *S*s. Thus the optimum number of reinforcements seems to have been considerably less than 30 and perhaps even fewer than 10. Beyond the optimum, retained learning seems to be inversely related to number of reinforcements given.

D. DISCUSSION

The results of this study suggest that the reinforcing power of a light flash weakens after the light has been presented a number of times. Several previous studies have obtained results supporting this interpretation. Kling, Horowitz, and Delhagen (4) and Davis (2) both found greatest responding on the first day of lever training, with response rates declining on subsequent lever-training days. Davis refers to this effect as "apparent extinction of the reinforcing power of light onset" (2, p. 498). Further evidence that light onset soon loses its reinforcing power is provided by the within-session decrements in responding that have often been observed (e.g., 4, 6). In the present study, 14 of the 19 *Ss* in the 90-reinforcement group reached the one-hour training limit without having pressed 90 times; the median number of pressses in that group was 74.

That light-onset reinforcement weakens with use is, of course, consistent with the supposition that novel stimulus events are reinforcing to rats. However, other kinds of novel stimuli do not seem to possess the same reinforcing power as the onset of dim light. For example, Hurwitz (3) and Robinson (7) failed to find a reinforcing effect of light offset. Similarly, in an unpublished study using the same procedure as the present experiment, one of us tested the reinforcing power of a 1-sec. buzzer. No evidence for reinforcement was found. Perhaps the formulation best supported to date is that light onset is reinforcing to rats, but only to the extent that it is novel, i.e., has seldom been presented recently.

E. SUMMARY

Three groups of rats were given 10, 30, and up to 90 weak-light reinforcements for bar pressing. They were returned to the apparatus the next day for a 15-min. extinction period. Only the 10-reinforcement animals pressed reliably more than their controls during extinction. It was suggested that the light flash temporarily loses its reinforcing power when it is presented repeatedly.

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AN OPERATIONAL DETERMINATION OF THE MEANING OF INDETERMINATE NUMBER WORDS WITH FEEBLE-MINDED CHILDREN*

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A. INTRODUCTION

It is indisputable that usual methods for the measurement of meaning such as questionnaires or paper-and-pencil tests limit the age of subjects, and therefore, previous studies in this field were mostly concerned with intellectually normal school children and upward. Recently, however, Cohen *et al.* (1) tried to determine the school children's interpretation of indeterminate number words (quantitative words) with an operational method for the measurement of meaning. It only requires each child to take out "a lot" or "a few" etc. of beads from a tray and put them in a paper bag beside the tray. Without knowledge of their experiment, Kumae carried out similar experiments with university students and school children a few years ago (2), and recently with preschool children (3).

This method is significant in that it operationally determines the meaning of a word through action. It may also be expected that this can be applicable even to the feeble-minded because of its simple procedure of the method. If so, we can see how they understand the meaning of indeterminate number words. As far as the authors know, no study is reported up to this time as to the measurement of meaning with feeble-minded children as subjects, and thus, the data from them are to be sure valuable.

It has generally been recognized that feeble-minded children are inarticulate and have a vocabulary only a few words. These are certainly regarded as the measures of the retardation or backwardness of development. However, it seems to be difficult for the authors to characterize their language only as the retardation of development. It is presumed that feeble-minded children, who have narrow experience, may understand the meaning of indeterminate number words quite differently as compared with normal children; that is, experiments with the feeble-minded may show results which cannot simply be interpreted in terms of the retardation of development. In this

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sense too, it is surely significant to see how the feeble-minded accepts indeterminate number words.

B. METHOD

Materials: Containers, trays and beads were prepared for this experiment. Containers were four in all and they were all the same in size and color: all were capable of holding about 500 beads. All of them contained 100 beads which were thin and were 1.5 cm. in diameter. These containers were put on the table one at a time, and a tray in which beads were to be put was placed beside the container. The trays were also the same in size and color.

Stimulus Words: Stimulus words were "very many of," "many of," "a few of" and "a very few of." Besides these four words, another word was prepared but has been eliminated here because of the lack of an appropriate English equivalent.

Subjects: The subjects consisted of 37 feeble-minded children in Hiroshima City. Tables 1 and 2 show number of the subjects classified by chronological and mental ages.

Procedure: The children were tested individually. Each child sat down

TABLE 1
NUMBER OF THE SUBJECTS CLASSIFIED BY CHRONOLOGICAL AGE

Chronological Age	Boys	Girls	Total
11	1	1	2
12	1	1	2
13	1	1	2
14	2	2	4
15	6	4	10
16	2	1	3
17	6	3	9
18	5	0	5
Total	24	13	37

TABLE 2
NUMBER OF THE SUBJECTS CLASSIFIED BY MENTAL AGE

Mental Age	Boys	Girls	Total
5	1	3	4
6	3	2	5
7	6	4	10
8	3	1	4
9	2	2	4
10	5	0	5
11	2	0	2
12	2	0	2
13	0	1	1
Total	24	13	37

on a chair before a table. He was asked to take out, for example, "many" beads from a container and put them on a tray. This procedure was followed with each of the other three stimulus words.

C. RESULTS AND DISCUSSION

The actual number of beads taken can be regarded as the score. In analysing the data, all subjects participating in this experiment were classified into three groups of A (8 children), B (12) and C (17) according to their scores for "very many of" and "many of." Table 3 contains the means and corresponding standard deviations of each group.

TABLE 3
MEAN AND SD OF THE SCORES FOR FOUR STIMULUS WORDS IN EACH GROUP

	Group A		Group B		Group C	
	Mean	SD	Mean	SD	Mean	SD
very many of	76.38	11.97	100.00	0	100.00	0
many of	78.63	14.97	63.33	15.09	100.00	0
a few of	22.00	8.87	18.58	9.88	20.41	11.46
a very few of	15.75	10.43	15.25	10.77	11.71	7.60

As readily seen in the Table, the quantities meant by the words "very many of" and "many of" are 76.38 and 78.63 respectively for Group A. There is no significant difference between these two scores. For the feeble-minded of both Groups B and C, on the other hand, the quantity meant by the word "very many of" is equal to that of "all." However, these two groups differ in that Group B children regard the meaning of "many of" as about 63, whereas the meaning of that word is equal to that of "very many of" for Group C children.

The fact that feeble-minded children are classified into three groups according to their scores for "very many of" and "many of" is worthy of attention. The feeble-mindeds differ from the normals in this point. The authors wrote elsewhere that the scores for indeterminate number words tended to increase with age (3). But, even when university students were the subjects, the means of the score for "very many of" did not exceed 80, and it must be emphasized that no students obtained the score of 100. This fact suggests that the language of the feeble-minded cannot be characterized only as the retardation of development. Once again, in the normals the score for "very many of" is 14.41 in the case of 4 years and it increases with age. The mean of the scores of 100 university students for this word was 77.47. As for feeble-minded children, twenty-nine out of thirty-seven in this experiment obtained the score of 100 for that word. In other words, three quarters of feeble-minded children interpreted "very many of" as equal to the meaning of "all." This difference of the feeble-minded from the normals in the interpretation of this word cannot properly be expressed in terms of the retardation of development.

The children who belong to Group B or C are seen regardless of the chronological and mental ages, and so, this way of accepting the above words does not seem to have relation with the ages.

As to the other two words, no significant differences were found between the scores of three groups for each word. In consequence, three scores for each word were combined, obtaining the means and standard deviations of 20.16 and 10.52 respectively for "a few of" and 13.73 and 9.56 respectively for "a very few of." Since the difference between these two means is significant at the one per cent level, it is pointed out that generally speaking, feeble-minded children accept these two words correctly.

Lastly a short mention should be made of the reliability of this test when applied to feeble-minded children. Test-Retest Coefficient for each word are shown in Table 4. In this Table .605 of "very many of" is rather low.

TABLE 4
TEST-RETEST RELIABILITY COEFFICIENT

	very many of	many of	a few of	a very few of
r_s	.605	.723	.722	.782
t	4.49	8.127	8.101	9.908
P	$< .001$	$< .001$	$< .001$	$< .001$

$df = 35$

This low correlation coefficient is ascribable to the change of the score of Group A, because all children of Groups B and C obtained the same scores in both tests. We can conclude from Table 4, thus, that this method has the reliability even when applied to feeble-minded children.

D. SUMMARY

Thirty-seven feeble-minded children were tested with an operational method for the measurement of the meaning of indeterminate number words. This method differs from usual ones such as questionnaires or paper-and-pencil tests in that it operationally determines the meaning of a word through action. It only requires each child to take out "many" or "a few" etc. beads from a container and put them on a tray. Because of this simple

procedure it was expected that this could be applicable even to feeble-minded children. Stimulus words selected for this study were "very many of," "many of," "a few of" and "a very few of."

The main findings are summarized as follows:

1. Feeble-minded children can be classified into three groups according to their scores for "very many of" and "many of." In Group A children the scores of "very many of" and "many of" were 76.38 and 78.63 respectively when the background number was 100. The difference between these two scores is not significant. For Groups B and C the meaning of "very many of" is equal to that of "all." These two groups, however, differed in that Group B children regarded the meaning of "many of" as about 63, whereas Group C children regarded the meaning of this word as equivalent to that of "very many of."
2. It was suggested from the comparison with normal subjects that the language of feeble-minded children could not necessarily be characterized as the retardation of development.
3. Feeble-minded children seem to understand the two words correctly as "a few of" > "a very few of." However, they do not necessarily seem to regard the meaning of the four words of this experiment as "very many of" > "many of" > "a few of" > "a very few of."
4. Lastly, mention was made of the reliability of this method when applied to feeble-minded children.

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SOME RELATIONSHIPS BETWEEN INTELLECTUAL EFFICIENCY AND THE SEVERITY OF PSYCHIATRIC ILLNESS*

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One of the most frequent manifestations of psychiatric illness is a loss in intellectual efficiency. This phenomena has been called "intellectual deficit" by Hunt (1944) in the attempt to establish an operational definition free from the predisposition to judge such a loss as irreversible (dementia) or progressive (deterioration). Most investigators, however, have tended to view deficit as a characteristic associated with the presence or absence of specific types of psychiatric illness. This tendency to differentiate deficit by type of illness has obscured the fact that deficit may change during the course of an individual's illness. However, Dowis and Diethelm (1958) reported that individual psychiatric patients demonstrated extensive variability in cognitive functioning during the course of a single hospitalization. In that study, loss of intellectual efficiency was associated with an increase in the intensity of manifest clinical anxiety. Their work suggests that the severity of psychiatric illness may influence cognitive efficiency independently of the diagnostic classification of the illness.

An extensive body of literature suggests that psychiatric patients exhibit a discrepancy between the efficiency of verbal and nonverbal modes of cognition. It has been suggested that the extent of this discrepancy may serve as the basis for inferring the amount of intellectual deficit produced by the presence of psychiatric illness (Babcock, 1941; Shipley, 1940). Jastack (1949) has criticized this inference and suggested that such a discrepancy may be a valid index of deficit only for patients of higher socio-economic status. These considerations suggest the utility of investigating both *deficit* and *discrepancy* as a function of the severity of psychiatric illness, and further suggest the advantage of relating the findings to intellectual achievement.

To facilitate the investigation into the variability of cognitive functioning,

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three areas of inquiry were delineated. Each area was represented by a hypothesis which predicted the direction of change in intellectual efficiency. The hypotheses share a common independent variable: severity of psychiatric illness.

Hypothesis 1: *A positive relationship exists between the relative severity of psychiatric illness and loss of intellectual efficiency.* This hypothesis deals with the concept of deficit. Therefore, it must be tested by the difference between performance on identical tests administered at two levels of severity of illness.

Hypothesis 2: *An increase in the relative severity of psychiatric illness is associated with an increase in the discrepancy between performance on a test of vocabulary retention and performance on a test which requires nonverbal conceptual thinking.* This hypothesis deals with the concept of *discrepancy* when it posits a difference between verbal and nonverbal performance. Therefore, it may accept as data the differences between scores derived from a single administration of two different tests. However, this hypothesis deals with *deficit* when it posits that different amounts of discrepancy will be found at different levels of severity of illness. Consequently, it must be tested by comparing the differences between each of two performances obtained at each of two levels of severity of illness.

Hypothesis 3: *An increase in differential discrepancy associated with an increase in the severity of illness will be most frequent in those patients who give evidence of superior intellectual functioning prior to hospitalization.* Here, differential discrepancy signifies the difference which exists between (*a*) verbal-nonverbal discrepancy at a period of severe behavioral pathology, and (*b*) verbal-nonverbal discrepancy at a period of minimal behavioral pathology.

A. PROCEDURES

1. *Selection of the Sample*

The subjects for this investigation were seventy-five inpatients hospitalized in the psychiatric units of a university teaching hospital. In order to allow a test of the effect of severity of pathology independent of diagnosis, the sample was composed of an unselected series of consecutive admissions between 25 and 50 years of age. Information concerning educational achievement was obtained and those patients who had not graduated from high school were excluded from the sample.

2. *The Measurement of Relative Severity of Psychiatric Illness*

In the work reported by Dowis and Diethelm (1958), the severity of the level of psychiatric illness was measured by clinical observations. This method proved effective but lacked the objectivity required for easy replication. For purposes of the present investigation a more objective measuring instrument was utilized. Each day every patient in the sample was independently rated by two psychiatric nurses on the basis of the presence or absence of 29 overt behaviors that are associated with psychiatric illness. This procedure gave a longitudinal index of daily variation in the severity of behavioral pathology for each patient in the sample.[2] A period of severe behavioral pathology was defined as a period of at least three consecutive days during which each of the patient's daily scores fell within the upper one-fourth of his range of scores during hospitalization. A period of minimal pathology was defined as a period of at least three consecutive days during which his scores fell within the lower one-fourth of this range.

3. *The Measurement of Intellectual Efficiency*

Each patient in the sample was examined on two occasions with two standardized tests of intelligence. The Progressive Matrices Test (Ravens, 1938) was adopted as a test of nonverbal conceptual thinking on the basis of evidence cited by Foulds (1949, p. 238). The Wide Range Vocabulary Test (Atwell and Wells, 1937) was adopted as a test of vocabulary retention. All tests were untimed and individually administered.

One of these examinations was arranged, for each patient, to coincide with a period of maximal behavioral pathology whereas the other examination was administered during a period when such pathology was at a minimal level. To control for possible effects of transfer of training and accommodation to hospitalization, a balanced order of testing and retesting was used. A total of 37 patients received their first examination during a period of minimal pathology and their second examination during a period of severe behavioral pathology; 38 patients were tested in the reverse order.

4. *The Measurement of Intellectual Attainment Prior to Hospitalization*

Wechsler (1944, p. 103) reports that educational attainment, when measured by number of years of formal education, "correlates to a relatively high degree" with intelligence as measured by test scores. For this reason, the number of years of school attendance was adopted as an index of intellectual attainment prior to hospitalization for subjects in this study.

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[2] An investigation into the reliability of this index is being prepared for publication. When reliability is interpreted as inter-rater agreement the index produces a reliability coefficient of 0.84.

For purposes of comparison, subjects were divided into two groups. Group I consisted of those patients who had completed high school and those who had attended college but failed to attain a degree, Group II consisted of those patients who had obtained a college degree and those who had attended graduate schools. Examination of hospital records suggested this as an actuarially equal division in the psychiatric population of the university teaching hospital.

B. RESULTS

Hypothesis 1: The first hypothesis states that an increase in the severity of psychiatric illness will reduce intellectual efficiency. It, therefore, predicts a difference between test-retest scores on both the Wide Range Vocabulary Test and the Progressive Matrices Test such that they will be lower during a period of maximal behavioral pathology and higher during a period of minimal behavioral pathology. This prediction may be tested by comparison between the mean scores obtained under the two conditions of testing. The results appear in Table 1.

These comparisons produced contrasting results. The first hypothesis was not confirmed for changes in intellectual efficiency as measured by the Wide Range Vocabulary Test. Efficiency of vocabulary retention was not associated with severity of behavioral pathology. This evidence extends Jastak's (1949) conclusion that vocabulary is uninfluenced by the *presence* of mental illness by suggesting that it is also uninfluenced by the *severity* of such illness. A statistically significant difference ($p < .05$) between the two conditions of testing was indicated for the Progressive Matrices Test. The direction of change was predicted by the hypothesis: loss of intellectual efficiency is associated with maximal behavioral pathology.

These results indicate that the loss of intellectual efficiency associated with an increase in the severity of behavioral pathology was not generalized over all areas of cognitive functioning, but that nonverbal conceptual thinking was significantly impaired while verbal performance remained relatively unchanged. As severity of behavioral pathology increased, deficit appeared in nonverbal performance, but did not appear in verbal performance.

Hypothesis 2: The second hypothesis states that severe psychiatric illness will increase the discrepancy between vocabulary retention and nonverbal conceptual thinking. Therefore, it predicts a greater difference between the two

TABLE 1
COMPARISON OF DEFICIT AT TWO LEVELS OF BEHAVIORAL PATHOLOGY

	Minimal illness		Maximal illness		Difference		
	Mean ($N = 75$)	S.D.	Mean ($N = 75$)	S.D.	Between means	S.E.	p
Progressive Matrices Test (P.M.T.)	49.87	6.36	42.47	7.39	7.40	4.34	$p < .05$
Wide Range Vocabulary (W.R.V.T.)	80.23	7.56	76.80	9.12	3.43	3.67	$p > .05$

test scores obtained at a period of maximal behavioral pathology than between those obtained at a minimal period. To test this prediction all raw scores were converted to standard scores. The difference between Wide Range Vocabulary Test scores and Progressive Matrices scores was then computed for each of the two conditions of illness. The comparison between the means of these two sets of difference scores constitutes a test of the second hypothesis. This comparison appears in Table 2.

A statistically significant difference ($p < .05$) was obtained. The results of this comparison indicate that the difference between vocabulary retention and nonverbal conceptual thinking is significantly increased during a period of severe behavioral pathology. As severity of behavioral pathology increases, the discrepancy between verbal and nonverbal performance increases.

Hypothesis 3: The third hypothesis states that the largest changes in verbal-nonverbal discrepancy will be found among individuals with evidence of superior intellectual functioning. Therefore, it predicts that the largest increases in discrepancy scores will be found most frequently among those individuals who have completed more years of formal education. To test this prediction the difference between the difference of standard scores at each period of testing was computed. This score was called the *differential discrepancy* score. The comparison between the means of these scores for the non-college graduate group (Group I) and the graduate group (Group II) constitutes a test of the third hypothesis. This comparison appears in Table 3.

A statistically significant difference between means ($p < .01$) was obtained. The results of this comparison indicate that the two groups were not equally affected by an increase in the severity of behavioral pathology. As a group, those individuals with superior intellectual achievement prior to hospitalization showed a disproportionately large increase in the discrepancy between verbal and nonverbal modes of cognition.

These statements about the groups may be misleading without further demarcation within Group II. Inspection of the frequency distribution of differential discrepancy scores suggests that losses for the individual in the college educated group tended to be bimodally distributed. Within Group II, 36 per cent of the subjects showed losses which were greater than those of any individuals in Group I. Thus, the most extreme increases in discrepancy under conditions of severe pathology occurred in Group II; however, not all members of this group showed extreme losses.

TABLE 2
COMPARISON OF DISCREPANCY AT TWO LEVELS OF BEHAVIORAL PATHOLOGY

	Minimal illness		Maximal illness		Difference		
	Mean (N = 75)	S.D.	Mean (N = 75)	S.D.	Between means	S.E.	p
Difference between Z scores (P.M.T. and W.R.V.T.)	.184	.597	1.320	.801	1.136	.643	$p < .05$

TABLE 3

COMPARISON OF DIFFERENTIAL DISCREPANCY AT TWO LEVELS OF BEHAVIORAL PATHOLOGY

	Group I Without degree		Group II With degree		Difference		
	Mean (N = 36)	S.D.	Mean (N = 39)	S.D.	Between means	S.E.	p
Differential discrepancy scores	.942	.473	1.294	.746	.352	.143	$p < .01$

C. Discussion

The principal significance of this investigation lies in the establishment of a relationship between the relative severity of behavioral pathology and the intellectual efficiency of psychiatric patients. The strength of this relationship suggests a source of uncontrolled variation in those studies which have associated differential amounts of intellectual deficit or discrepancy with various diagnostic categories. As early as 1902, Krapelin suggested that deficit in the performance of simple arithmetic could distinguish normal, neurotic and psychotic groups. The extensive literature summarized by Hunt (1944) indicates that diagnosis has continued as the major independent variable in the study of the intellectual efficiency of psychiatric patients. In general, such studies have established a rough correlation between intellectual efficiency and diagnostic categories, however, improvement in the measurement of intellectual functioning has not been associated with a proportionate improvement in the diagnostic precision of the measurements. The present investigation indicates that the level of cognitive efficiency is more a function of the severity of psychiatric illness than a distinguishing characteristic of any specific nosological entity. Such findings go a long way toward explaining both the initial success and subsequent lack of progress in relating intellectual efficiency to diagnosis.

The initial success in associating specific diagnostic categories with differential levels of cognitive efficiency may have occurred because there is, indeed, a rough correlation between these categories and relative severity of illness. The average severity of behavioral pathology may be greater for a group of schizophrenic patients, for example, than it is for a group of neurotic patients. However, the magnitude of the correlation between severity of behavioral pathology and any particular diagnostic category limits the precision of differentiating diagnostic categories on the basis of deficit or discrepancy. In fact, there are frequent exceptions to this relationship between severity of pathology and specific diagnostic groups. For example, it is not uncommon to find neurotic patients who show, at some periods, greater severity of behavioral disorder than is seen in some cases of ambulatory schizophrenia. With the traditional use of deficit as a technique of assessment, it may be precisely these patients who are the exceptions to the group norms and who are not, therefore, identified by these techniques. Moreover, it is the ability to differentiate these patients, especially, that is crucial for an increase in the diagnostic precision of measures of intellectual efficiency. In this context, the present demonstration of a relationship between cognitive efficiency and severity of behavioral pathology points up the necessity to control and measure this variable if the diagnostic accuracy of cognitive tests is to be increased.

In addition to establishing a relationship between severity of behavioral pathology and cognitive functioning, the present investigation supports previous studies by demonstrating this relationship to be a complex one in which an increase in the severity of illness is associated with a differential loss between verbal and nonverbal modes of cognition. Such a differential loss may be called *cognitive imbalance* to distinguish it from the overall lowering in cognitive efficiency that has classically been associated with dementia and deterioration among chronically ill psychiatric patients. The present study demonstrates that an increase in the severity of pathology is associated with drastic cognitive imbalance but is not associated with deterioration. In other words it suggests the possibility that it is not simply a general lowering of cognitive efficiency but an increase in the discrepancy between verbal and nonverbal efficiency that produces the "thinking disorders" associated with non-chronic psychiatric illness.

The results also indicate that such cognitive imbalance is most frequent and most severe in those patients with superior educational achievement. It seems reasonable to assume that academic achievement reveals a strong investment in the intellect. The highly educated individual is apt to have based his life adjustment on intellectual efficiency and, therefore, to be especially threatened by its disruption. To the extent that such a threat leads to an intensification of disruptive emotional states, a reciprocal action may be instituted in which cognitive imbalance intensifies emotion and emotion intensifies imbalance. The role of cognition in such a process was not specifically explored by the present investigation. However, the fact that a discrepancy between the efficiency of two modes of cognitive functioning was most severe in highly educated patients suggests that in certain etiological sequences cognitive imbalance may serve as a primary source for the disruptive emotions associated with severe behavioral pathology.

D. SUMMARY

A group of 75 psychiatric inpatients, unselected with regard to diagnosis, served as subjects for this investigation. The verbal and nonverbal intellectual efficiency of each patient was measured at two levels of severity of behavioral pathology. The principal significance of this investigation lies in the establishment of the fact that an increase in the severity of behavioral pathology is associated with a deficit in the efficiency of intellectual functioning. These results suggest that the severity of behavioral pathology, independent of

diagnosis, functions as a crucial variable in studies which attempt to relate cognitive efficiency with diagnostic categories.

In addition, the results of this investigation indicate that an increase in behavioral pathology is associated with a significant loss in nonverbal modes of cognition but that verbal efficiency remains relatively unchanged. Also, patients characterized by superior intellectual achievement showed disproportionate vulnerability to this type of differential loss of efficiency. These results suggest the possibility that an increase in the *discrepancy* between verbal and nonverbal cognitive efficiency may be as important as simple nonverbal deficit in producing the thinking disorders associated with acute psychiatric illness. It may be speculated that highly educated individuals, who presumably have greater investment in intellectual efficiency, will show a more pronounced emotional reaction to a cognitive deficit. This may lead to a reciprocal process in which cognitive disfunction produces emotional responses which in turn contribute to an increased loss of cognitive efficiency.

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TEMPORAL ORGANIZATION OF BEHAVIOR*

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In many of the studies in which duration of performance is the critical variable, subjects have been asked to respond at their maximum speed; for instance, reaction time studies, studies involving speed of movement, speed of perception, and so forth. The results of these investigations usually do not take into consideration the spontaneous speed of the individuals, though in terms of an interpretation of behavior this may conceivably give important information as to the temporal limits within which an individual may function optimally. For example it was found (5) that ergographic performance as a whole is at an optimum when a given metronome tempo coincides with the tempo that the individual adopts naturally.

The purpose of this study is to investigate some characteristics of personal tempo in a restricted experimental situation. By personal tempo is understood the temporal pattern that subjects adopt sponaneously when engaged in the performance of a task. Thus studies where the subject is asked to reproduce a given temporal pattern (3) are not strictly comparable to those in which subjects are free to set their own tempo.

In a study on expressive movements Allport and Vernon (1) recognized the importance of investigating temporal aspects of behavior and described three broad speed factors identified as: verbal, manipulative, and rhythmic.

Frischeisen-Kohler (4) concluded that there was a general factor of personal tempo which she interpreted as a stable and generalized personality characteristic. Her definition of the factor was based on the value of the intercorrelations obtained among a very limited number of variables: mostly tapping activities and preferred metronome rates.

In a study specially designed to investigate whether there is a single factor of personal tempo, as suggested by Frischeisen-Kohler, it was found that when a comprehensive range of functions is explored it is not reasonable to conclude that only one factor can explain all of them (6).

However in all these studies it was found that under a variety of circumstances operationally defined units of behavior show a remarkable temporal

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constancy. For instance, subjects performing ergographic work execute almost the same number of contractions per time unit independently of their state of fatigue (5). That is the intra-individual variability in time spent in performing the unit of behavior is very small. Scanning the literature on the subject it is found that this is usually a casual observation made by the experimenter (2).

In the present study we shall investigate the constancy of tempo units when subjects are instructed to tap visually presented stimuli on a telegraph key.

A. Experimental Procedure

Each subject was presented with a set of seventeen patterns of dots, each pattern drawn with black ink on a white 5″ × 7″ card. The patterns were as follows:

DOT PATTERNS

1	.														
2	.	.													
3	.	.	.												
4	.	.	.	.											
5	.	.	.	.	.										
6	.	.	.	.	.	.									
7	.		.	.											
8	.		.	.	.										
9	.		.	.	.	.									
10	.	.			.	.	.								
11	.	.			.	.	.	.							
12	.	.	.		.	.	.	.							
13	.			.	.			.	.	.					
14	.			.	.			.	.	.	.				
15	.			.	.	.		.	.	.	.				
16	.	.		.	.	.		.	.	.	.				
17	.			.	.			.	.	.		.	.	.	.

The subjects were instructed to tap the pattern shown on the card in their "most natural congenial manner" and "to continue tapping" until asked to stop.

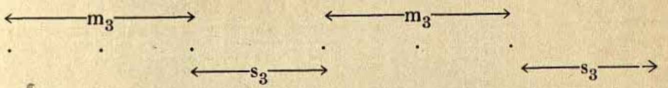
The fifteen subjects (11 males and 4 females), all university students, tapped pattern one (single dot) first. For the remaining patterns the order of presentation was as follows: five subjects tapped patterns 2 to 17 in that order, six subjects tapped pattern 17 to 2 in that order, four subjects tapped patterns 2 to 17 in a randomly assigned order.

Notice that the subjects did not have to reproduce a temporally given pattern but to organize temporally the pattern presented in the cards, that is, they were free to tap at any speed they preferred.

A graph of the performance of each subject was obtained by means of an ink stylus that was activated by depressing a telegraph key. The tape on which performance was recorded was pulled by a kymograph moving at a constant rate. A second ink stylus recorded on the same tape intervals of five seconds. Since the speed of the tape was constant, it is possible within a linear transformation to relate length of tape to time. The measurements on which this report is based are length estimates.

Each subject was presented pattern one first in order to acquaint him with the task. For each successive pattern subjects were allowed a warming up period after which one minute of tapping was recorded.

In the present study only the results obtained by tapping patterns 2 to 6 inclusive will be discussed. The graph obtained by each subject for each pattern was measured with a ruler calibrated in millimeters. For instance m_3 and s_3 represent respectively the distance between the first and last dot in each group of three dots and the distance between two successive groups of three dots.



The numerical subindex for both m and s corresponds to the number of pattern as given before.

B. Results

Tables 1 and 2 give respectively the means, standard deviations, and coefficients of variation for the m and s values for each subject. Inspection of Tables 1 and 2 shows the consistency of performance for each subject. This is indicated by the small values of the standard deviations and coefficients of variation.

The last row of Table 1 and Table 2 gives the mean of the means for the m's and s's for all the subjects. This is presented graphically in Figure 1.

Inspection of Figure 1 shows clearly that the means for the m's increase linearly in relation to the number of dots tapped. On the contrary the means for the s's are constant throughout all the patterns.

Though it seems quite obvious that the increase in values of m is significant while the differences between the s's are not so, it was considered advisable to prepare two analyses of variance, one for the m's and the other for the s's.

The result of these analyses[1] indicates that for the m's both the intra- and

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[1] A more detailed form of this paper (or extended version, or material supplementary to this article) has been deposited as Document number 6539 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A copy may be secured by citing the Document number and by remitting $1.25 for photoprints, or $1.25 for 35 mm. microfilm. Advance payment is required. Make checks or money orders paypable to: Chief, Photoduplication Service, Library of Congress.

TABLE 1

MEANS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIATION FOR PATTERNS M_2 THROUGH M_6

	M_2			M_3			M_4			M_5			M_6		
Subjects	M	σ	CV	M	σ	CV	M	σ	CV	M	σ	CV	M	σ	CV
1	5.88	.276	4.69	9.31	.359	3.86	12.04	.451	3.74	15.70	.422	2.69	18.39	.486	2.64
2	6.88	.485	7.50	9.85	.555	5.63	8.70	.561	6.43	10.82	.372	3.44	11.31	.479	4.23
3	4.13	.449	10.87	7.02	.404	5.75	9.80	.480	4.89	11.97	.289	2.41	14.12	.592	4.19
4	5.14	.271	5.27	8.38	.452	5.39	10.96	.139	1.26	14.11	.300	2.12	17.04	.568	3.33
5	4.07	.594	14.58	6.29	.322	5.11	8.25	.361	4.38	10.14	.392	3.86	12.47	.464	3.72
6	7.31	.458	6.27	12.35	.427	3.46	17.25	.886	5.14	22.81	.594	9.14	29.40	.894	3.04
7	6.44	.442	6.87	11.50	.456	3.97	16.21	.394	2.43	21.42	.376	1.76	26.17	.516	1.97
8	5.02	.102	2.03	8.84	.352	3.98	11.92	.417	3.50	16.27	.607	3.73	19.18	2.041	10.64
9	4.94	.171	3.46	7.08	.277	3.91	10.42	.469	4.50	13.80	.350	2.54	17.15	.474	2.76
10	8.14	.363	4.46	13.86	.636	4.59	19.56	.726	3.71	24.88	.518	2.08	29.36	.742	2.53
11	4.08	.236	5.79	6.43	.889	13.82	8.83	.362	4.10	10.63	.352	3.31	14.86	.552	3.71
12	8.65	.669	7.73	11.44	.527	4.61	14.17	.250	1.76	19.89	.546	2.75	23.64	.476	2.01
13	4.37	.270	6.19	6.76	.257	3.81	8.73	.937	10.73	11.96	.582	4.87	13.88	.870	6.27
14	4.97	.129	2.60	5.79	.258	4.45	8.41	.476	5.65	10.29	.378	3.67	12.83	.707	5.51
15	6.62	.423	6.39	12.36	.457	3.70	14.22	.894	6.27	20.32	.681	3.35	20.62	.518	2.51
$\frac{\Sigma M}{N}$	5.78			9.15			11.96			15.65			18.70		

TABLE 2
MEANS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIATION FOR INTERVALS S_2 THROUGH S_6

	S_2			S_3			S_4			S_5			S_6		
Subjects	M	σ	CV	M	σ	CV	M	σ	CV	M	σ	CV	M	σ	CV
1	6.13	.366	5.97	6.87	.790	12.02	6.41	.437	6.82	6.89	.600	8.72	7.50	.926	12.34
2	4.78	.364	7.61	4.00	.204	5.11	4.38	.977	22.30	4.36	.497	11.40	4.47	.399	8.94
3	4.23	.374	8.84	4.30	.349	8.11	3.90	.375	9.61	3.94	.403	10.23	4.53	.386	8.52
4	4.70	.408	8.69	4.09	.264	6.46	4.50	.354	7.86	4.08	.277	6.80	4.68	.337	7.20
5	6.16	.472	7.67	5.50	.433	7.87	4.15	.463	11.16	4.10	.681	16.60	4.10	.507	12.37
6	6.59	1.317	19.98	8.04	.259	3.22	8.06	1.084	13.44	6.50	.957	14.73	5.10	1.084	21.25
7	12.00	.378	3.15	13.42	.515	3.84	13.67	.753	5.51	14.20	.758	5.34	14.40	.652	4.53
8	6.83	.351	5.14	6.70	.317	4.73	7.77	.647	8.33	7.04	.472	6.70	7.60	1.062	13.97
9	14.57	.980	6.72	16.04	.498	3.10	14.91	1.643	11.02	14.33	.750	5.23	13.33	.221	1.66
10	14.23	.780	5.48	13.95	.725	5.19	13.81	.594	4.30	11.28	1.866	16.55	8.71	.466	5.34
11	8.15	.580	7.12	7.41	.570	7.69	6.54	.536	8.19	7.03	.365	5.19	6.55	.643	9.82
12	10.17	.707	6.95	14.69	.884	6.02	12.11	.928	7.66	9.31	.530	5.70	11.58	.861	7.44
13	3.91	.288	7.37	4.06	.429	10.56	4.09	.490	10.01	4.04	.620	15.35	4.67	1.030	22.05
14	9.82	.868	8.84	10.68	.751	7.03	6.63	.742	11.19	7.31	.663	9.06	9.13	.876	9.60
15	5.91	.325	5.50	7.43	.704	9.47	5.17	.673	13.01	7.00	.527	7.53	5.39	1.219	22.62
$\frac{\Sigma M}{N}$	7.88			8.48			7.74			7.43			7.45		

inter-individual variabilities are significant. For the s's, although there are significant differences among individuals at the 1 per cent level, within each individual these values are not significantly different. This corroborates the results graphed in Figure 1.

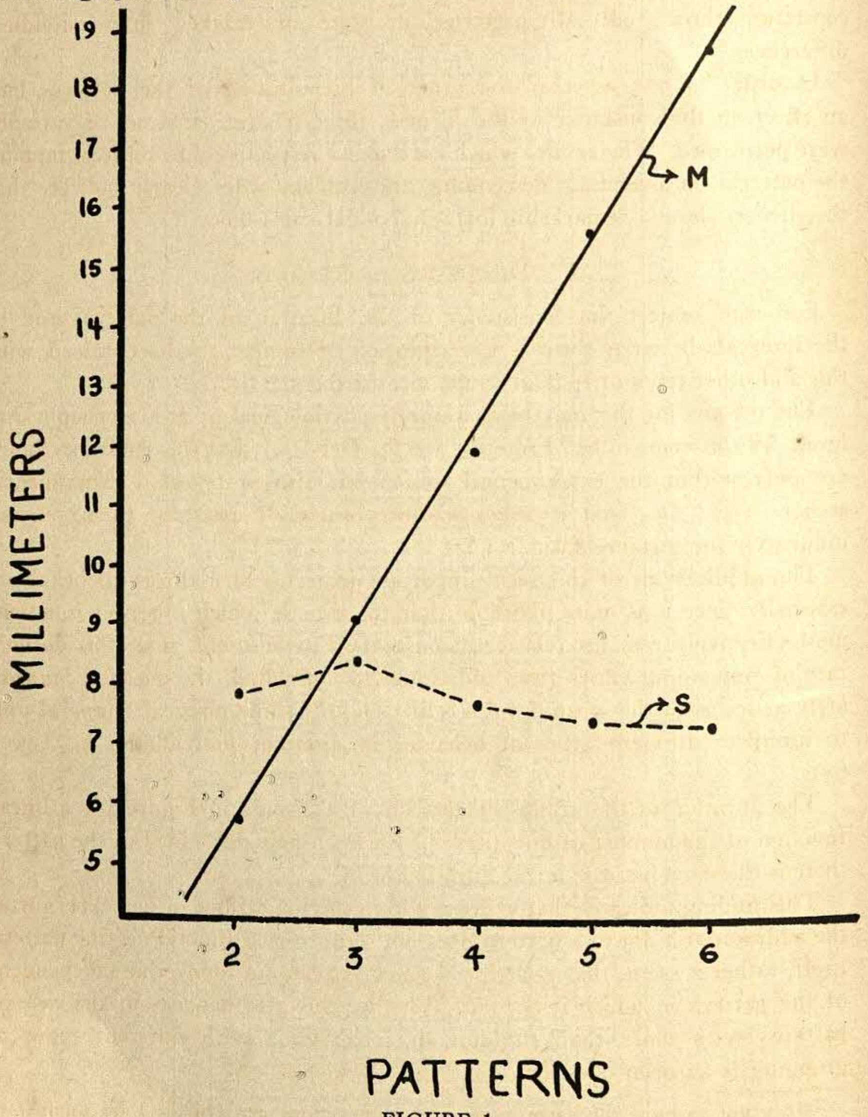

FIGURE 1
GRAPHICAL REPRESENTATION OF THE MEAN OF THE MEANS FOR THE VALUES OF PATTERNS M_2 THROUGH M_6 AND INTERVALS S_2 THROUGH S_6

Graphs similar to the one of Figure 1 were made for each subject, indicating in all cases similar trends to those depicted in Figure 1 for all the group.

Another analysis of variance of the size of the s's was performed for all the subjects of our experimental groups. The results indicate the intra-individual constancy throughout all patterns, in spite of marked inter-individual differences.[2]

In order to test whether the order of presentation of the patterns had an effect on the constancy of the silences, three separate analyses of variance were performed. The results which correspond respectively to subjects tapping the patterns, in ascending, descending, and random order clearly indicate that the silences show a remarkable intra-individual consistency.

C. DISCUSSION OF RESULTS

For each subject the consistency of the duration of the patterns and of the intervals between them is a verification of similar results obtained with this and other types of tests in tempo measurements (6).

The reasons for this may be at a purely physiological or at a psychophysical level. What seems to be of interest are the facts (*a*) that this constancy holds not only within the experimental session but also in repeated experimental sessions (6); (*b*) that it seems to be considerably resistant to extraneous influences, for instance fatigue (5).

The implications of this seem important in terms of a theory of behavior; especially since it is quite plausible that the rate at which a person functions most effectively remains relatively constant. Furthermore, since this optimal rate of responding varies from individual to individual, the question immediately arises as to the meaningfulness of using the same physical temporal unit to interpret different types of behavior in different individuals; i.e., speed tests.

The duration of the groups of dots (m's) as shown in Figure 1 is a linear function of the number of dots tapped. For each new dot added to the pattern there is the same increase in the duration of m.

This finding indicates that at least within the limitations of our experiment, the addition of a dot to a pattern does not seem to be a function of the pattern itself, rather it seems that each dot has a corresponding time value independent of the pattern in which it occurs. Whether this also happens in the case of patterns with more than six dots or in patterns with different types of grouping is an open question.

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[2] In order to have the same number of observations per cell the total number of entries in the original matrix was reduced to 5, since this corresponds to the smallest number of entries for any subject.

In marked contrast the duration of the intervals between the groups of dots is practically constant, as can be verified by inspection of Figure 1 and by the study of the corresponding analyses of variance. This finding may be interpreted as indicating the existence of a behavioral temporal unit characteristic of each individual that may or may not be specific for the type of activity described in this article. It may be interesting to investigate whether this unit also holds for other types of behavior. Of course we would not expect exactly the same absolute value in other types of behavior, but the functional relationships that may be obtained may serve to verify or deny the existence of the tempo factors postulated by Rimoldi (6).

The nature of the relationship between the duration of the groups of dots and the intervals precludes the interpretation that in this experimental situation the total duration of the different patterns plus their respective intervals will tend to approximate a constant value. If this were so, as the duration of the patterns increased, the duration of corresponding intervals would necessarily have to decrease. Obviously, this is not the case with our data, neither at the level of each individual nor for the total group. It is also clear that the ratio between m's and corresponding s's is not constant. What is constant beyond doubt is the duration of the intervals between the patterns. Thus, it may be postulated that subjects build their performances around what apparently seems to be a constant temporal unit. How this unit can be distorted is itself a matter for careful investigation, since it may throw light on the actual dynamics of temporal organization of behavior.

Another possible interpretation is that the temporal unit may be the increase in time between two successive patterns, since their duration is a linear function of the number of dots. Some evidence that constant temporal units may be found in animal behavior was presented by H. Schaefer (7).

In the light of these findings it might be highly rewarding to explore the properties of individual temporal units of behavior, and their implications for a theory of temporal organization of behavior.

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SCHIZOPHRENIA AND DEVIANT RESPONSE SETS PRODUCED BY AUDITORY AND VISUAL TEST CONTENT*

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In theoretically random response situations there is often a nonrandom character to the responses when they actually occur. For example, on the first toss of a coin, instead of a 50-50 chance distribution, subjects choose "heads" 80 per cent and "tails" only 20 per cent of the time as Goodfellow (1940) noted. Similar biases or sets are found in other unstructured situations such as the significant preferences for "yes" as opposed to "no," for "agree" as opposed to "disagree," etc. when there was no basis for choosing one response over another (Berg and Rapaport, 1954). Cronbach (1946, 1950) has described a number of such sets as they appear in psychological tests and shown how they affect test reliability and validity. Certain expressions of these biases have been considered to be deviant response sets and various writers have related them to personality characteristics. That is, when the responses of groups of *S*s who differ on some operationally defined behavioral characteristic are compared, those responses which significantly differentiate the two groups are considered to be *deviant responses* or manifestations of deviant response sets.

It is believed that almost any unstructured stimulus content can be used to evoke such deviant responses. Using only abstract designs to produce deviant responses, for example, Barnes (1955) was able to construct reasonably reliable and valid scales for the identification of schizophrenia, character disorder, etc. With a similar technique Hesterly and Berg (1958) were successful in employing deviant responses to reflect immaturity as defined by chronological age, and Roitzsch and Berg (1959) differentiated between normal and neurotic subjects on the basis of deviant responses. Asch (1958) found that negative response bias (tendency to chose *disagree* when in doubt) was associated with poor personal adjustment. Bullock (1960) found that

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[1] The authors wish to express their thanks to the Louisiana State Department of Hospitals, Division of Training and Research, for their support and cooperation in completing this study.

psychiatric patients revealed differences in performance in an operant conditioning situation when compared to normal subjects and that these differences, when treated as deviant responses, distinguished the normal from the patient groups. Grigg and Thorpe (1960) used the Gough Adjective Checklist to obtain deviant response frequencies which successfully identified these college freshmen who later required treatment for personal adjustment problems. Psychotic patients, unlike normal subjects, often embellish their test booklets and omit or double-check options. Adams and Berg (1960) showed that such qualitative deviant responses could be used to distinguish between schizophrenic and normal subjects.

Thus the evidence is strong that deviant response sets can be utilized to reflect a fairly broad range of personality characteristics without reference to any particular form of test stimulus material. In a chapter on "The Unimportance of Test Item Content," Berg (1959) reviewed a wide variety of clinical prediction studies and offered the Deviation Hypothesis (1955, 1957, 1961) as an explanatory principle which could account for the relative success of a wide range of test stimulus content in assessing personality characteristics. In this review the point was made that virtually any sense modality should be capable of being used for eliciting deviant response sets and these, in turn, could be used for purposes of personality appraisal. However, apart from studies by Cattell and Anderson (1953) which used responses to musical excerpts and Grings' (1942) *tautaphone* which used unclear, word-like sounds to measure personality, only visual stimuli had been used in evoking such sets for personality assessment purposes. The Cattell-Anderson test, it should be noted, employed actual musical passages and thus was relatively structured.

Accordingly, the present study sought to employ relatively unstructured auditory stimuli on the hypothesis that such stimulus content would produce deviant responses in sufficient quantity significantly to distinguish normal from schizophrenic groups. Then, the success of the auditory stimuli in differentiating such groups on the basis of deviant responses could be compared with visual stimuli which had already been successfully used for identifying similar groups.

A. METHOD

A total number of 164 white *S*s, 83 normal and 81 schizophrenic, were used in the present study. The normal *S*s were 47 males and 36 female students in an elementary psychology course. They averaged 13.2 years of schooling. The mean age of the normal males was 22.5 and 24.0 for the females. The schizophrenics consisted of 41 males and 40 females who had been diagnosed by the professional staff of the Southeast Louisiana Hospital. They averaged 10.9 years of schooling. The mean age of the schizophrenic males was 34.0 and 35.3 for the females. These patients were in the early stages of symptom remission and thus in reasonably good contact with the environment, an essential condition because of the paced nature of the auditory task employed in the present investigation.

Two tests, one auditory and one visual, were administered to all *S*s in groups of five to 15 each. The Audition Test (AT) was specially constructed for the present study. It consisted of 50 tape-recorded sounds which were relatively meaningless. These sounds included a variety of simple chords, pure tones warbled on a variable tone generator, a series of clicks, etc. Sound intensity was moderate to avoid startle reactions and crossing the threshold of auditory pain. The duration of each sound was 15 seconds and the interval between sounds varied from 12 to 18 seconds. The introductory instructions and the instructions which followed each sound were recorded along with the 50 sounds on a single tape. A total of 42 minutes was required for the entire test. The task of the *S* was to listen to each sound and, during the interval between sounds, to mark for each sound one of four options on a checklist as follows: *like much, like slightly, dislike slightly,* and *dislike much. The Perceptual Reaction Test* (PRT) by Berg, Hunt, and Barnes (1949) was used for the visual task. This test consists of 60 abstract designs and for each design the *S* is instructed to check either *like much, like slightly,* etc. as in the AT. The PRT has previously been used with similar normal and patient groups and requires about seven minutes to administer.

The AT and PRT were analyzed by tabulating the number of responses for each of the four options for every item. When the frequencies for each of the options were obtained, they were converted to percentages in order to compare groups with different numbers of *S*s. Because males and females differ in the expression of deviant responses, separate tabulations were made for each sex. Four comparisons were made as follows: between the normal and schizophrenic male *S*s on the AT; between the normal and schizophrenic female *S*s on the AT; and the same comparisons for males and for females on the PRT. This procedure follows what Edwards (1959) has termed the *criterion group method,* the method used in constructing the MMPI, the Strong Vocational Interest Blank, etc. In each comparison either 240 options on the PRT or 200 options on the AT were tested since there are 60 items on the PRT and 50 items on the AT and there are four options per item on both tests. The percentage of the criterion or normal groups who chose each option was compared with the percentage of the schizophrenic group choosing the same option, and tested for level of statistical significance by the use of chi-square in a contingency table as described by Mainland and Murray (1952). Those options which distinguished the normal from the schizophrenic groups at the .01 or .05 level of confidence were defined as *deviant responses* for purposes of the present study.

B. RESULTS AND DISCUSSION

There were 200 options on the AT and 240 options on the PRT; hence it should be expected that only two or three options for either test would, on the basis of chance, be significant at the .01 level of confidence and 10 or 12 would occur by chance at the .05 level. In other words, about 15 deviant responses should occur by chance when the .01 and .05 levels are combined. As may be seen in Table 1, this chance frequency of deviant responses is considerably exceeded. From 65 to 107 of the options differentiated the normal from the schizophrenic groups for either the auditory or visual test stimuli.

TABLE 1
DEVIANT RESPONSE FREQUENCIES: NUMBER OF SIGNIFICANT DIFFERENCES DISTINGUISHING NORMAL AND SCHIZOPHRENIC PRT AND AT RESPONSES

		PRT Responses		AT Responses	
		.01 level	.05 level	.01 level	.05 level
Group		N	N	N	N
Females	(N = 76)	81	26	37	34
Males	(N = 88)	26	40	30	35

Thus the hypothesis that auditory stimuli can produce deviant response sets which may be used for personality assessment purposes appears to be supported. Specifically, of the 200 theoretically possible responses on the AT, 71 distinguished normal from schizophrenic females at the .01 and .05 levels and 65 distinguished normal from schizophrenic males at the same levels. In other words, about one out of every three AT responses differentiated normal from schizophrenic *S*s. It seems highly probable that a schizophrenia scale could be developed for such auditory deviant responses, much like Barnes' (1955) PRT scale for schizophrenia and other psychopathological states. It would be necessary, of course, to demonstrate that auditory deviant responses are as effective as visual stimuli in differentiating not only normal from psychotic subjects but also in distinguishing various classes of psychopathology from each other.

C. SUMMARY

A variety of studies has shown that visual stimuli can be employed to produce deviant responses which, in turn, can be used for personality assessment. Auditory stimuli have been specifically utilized for this purpose in only two previous investigations. Accordingly, a specially prepared test consisting of 50 tape-recorded sounds, together with the necessary instructions, was administered to 83 normal and 81 schizophrenic subjects on the hypothesis that auditory deviant response sets could be identified and which would differentiate the two groups. Visual stimuli in the form of the Perceptual Reaction Test were also used for comparison purposes. Both tests satisfactorily distinguished the normal from the schizophrenic groups. Of 200 theoretically possible auditory deviant responses, about one out of every three differentiated normal from schizophrenic subjects at either the .01 or .05 level of significance.

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INTERFERENCE VS EXTINCTION AS LEARNING MODELS FOR PSYCHOTHERAPY*

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Studies of psychotherapy and theories as to its nature leave some puzzling doubts. Within the confines of a single article, an author may take now one viewpoint, now another. Emphasis on uncovering the repressed childhood origins of personality disturbances as necessary for successful therapy may be found along with statements that psychotherapy is a social re-learning process much like any other learning.

As a result of a lack of differentiation between various premises as to the nature of both psychotherapy and psychopathology, a lack of precise formulation of the behavioral processes exists. Effort is extended in this paper to develop a simple, logical analysis of the re-learning problem associated with overcoming psychopathology (7).

A. ASKING THE RIGHT QUESTION

The effort begins by asking what are the minimum conditions under which behavior change may occur. (Reference is not made to change resulting from neurological or structural alternations, from atrophy or disuse.)

It is hypothesized that one can change behavior only on three non-neurological grounds: by interference, by extinction, or by skill acquisitions (as with conventional definitions of learning). Our interest here is not in the usual problems of skill acquisition but with re-learning in connection with modifying psychopathology. Attention is therefore drawn to the similarities and differences between extinction and interference as models for psychotherapy.

More specifically, the purpose of this paper is to argue that extinction reduces to interference.

Learning, or skill acquisition in the conventional sense, is based on discriminations where the learned behavior increases in probability of occurrence, and the errors decrease, under a given set of conditions. One can be said to interfere with errors by discriminating them more clearly, by precluding their development. The Beta hypothesis of Dunlap illustrates this point: The

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learner deliberately types "hte" in order to correct this frequent error in typing the article, "the," by bringing under more direct motor control the previously poor discriminations. One thereby deliberately interferes with errors by increasing discriminatory acuity; with practice, this discrimination allows for skill increase of a greater or lesser degree.

B. EXPERIMENTAL EXTINCTION AND CLINICAL UNCOVERING

The situation with extinction—or "uncovering," as psychotherapists are prone to call it—is similar. The learning theory equivalent to catharsis or uncovering is the desensitization process of presenting in a new context (the therapist's office) the old stimuli that evoked anxiety or tension responses; this permits non-reinforcement, leading to extinction of the old, neurotic behavior, and a building up of a new set of discriminations that are relatively non-pathological (3, 4).

What the psychotherapist has failed to realize, we hypothesize, is that the process of extinction is fundamentally an interference process. Consider the classical conditioning and extinction studies of Pavlov, Watson, Jones, and others. In these studies, in broad outline, the negative or noxious (fear producing) stimulus was presented just prior to or simultaneous with the neutral object (the rabbit) which, in time, came to produce fear, anxiety and withdrawal responses to the rabbit. When extinction came back into the picture, the experimenter was able to systematically present the conditioned, noxious stimulus in milder, controlled stages without evoking the full intensity of the unconditioned stimulus (loud noise). In time, the conditioned fear object lost its noxious value and the fear to this object was said to have been extinguished.

C. AN ALTERNATIVE VIEWPOINT

This paradigm has led to the assumption on the part of psychotherapists that some original fear or anxiety provoking situation or situations have to be found, uncovered, extinguished by the simultaneous talking and re-living, which seem parallel to the conditioned fear and experimental extinction conditions. Hence the relatively long time necessary in real life, and in psychotherapy, traditionally felt to be necessary in order to lift the repression which buried the originally potent fear-and-anxiety conditioned experiences.

An alternative view is possible which, we feel, is simpler, more heuristic, more experimentally and clinically typical of life circumstances.

The alternative view states that extinction is a controlled and greatly simplified version of a broader-based interference. In the absence of knowing exactly what produced a fear or anxiety condition, one cannot be sure of the points-to-be-extinguished, as was possible in the classical conditioning experiments. In fact, in life situations and in typical clinical situations, the practical approach seems to be to search for *on-going processes* for their rehabilitative value; not for what was allegedly originally repressed, with eventual uncovering and extinction in mind.

D. EXTINCTION VS. INTERFERENCE WITH COMPLEX SKILLS

Take for example the situation of wanting to change from a standard keyboard system of typing to another system. One would not set out to extinguish the old system of typing; one would, rather, set about to develop new discriminations. By the same token new languages, new sets of pronunciations, new systems of communication, or any new, complex skill acquisition would seem to follow a discriminatory or interference model rather than an extinction model.

Consider another common, but more "emotionalized" situation: The overcoming of fears of the dark or of water, as with children. The problem here is how to gradually introduce more controls over the fear-producing situation by the frightened one. Such a situation does not call for an uncovering therapy—"What is to be uncovered?" but for the judicious handling of controls and opportunities for new discriminations—in short, for interference with old processes.

E. CLINICAL SITUATIONS MORE "EMOTIONAL"

The depth therapist would say that the therapeutic problem is more overladen with motivational and anxiety complications than is the development of new skills or even the overcoming of specific fears. It would be contended that the original motivating circumstances and the subsequent "neurotic defenses" would be the relevant features when discussing psychotherapy. The depth theorist would also say that the conditioned fear and extinction model from Pavlov was relevant for the therapeutic situation in that both derive from an original trauma, both receive protective "defensive maintenance," and both were overcome via an extinction route.

The main difference, however, from the interference viwpoint, between the simple conditioning and extinction processes, and the complex situation in the therapist's office, is that in the former instances the precise nature of the anxiety-provoking stimuli were known and could be brought under direct control. The elements of clear knowledge and direct control over what is known are relatively lacking in the therapeutic situation. Also, in the fear-of-darkness or fear-of-water circumstances one knows, or can know, to a considerable extent what elements have to be brought under control.

F. Knowledge Means Control

If one knows what the fear or anxiety provoking conditions are, they can then be brought under more or less direct control. If full knowledge is not available, control becomes indirect; judicious handling is required if results are to be constructive. This is precisely the point where the depth or uncovering therapists have said, in effect: "We must search for the original causes so that they can be uncovered and extinguished." Perhaps the non-directive therapist would assert that the "inner meaning" or the "phenomenological world" of the patient had to be revealed first. Both the psychoanalytic and non-directive positions stress the "inner" or "hidden" aspects of the problem which, one way or another have to be uncovered. The interference position, on the other hand, stresses the availability of *overt behavioral controls* which can be managed or shaped to meet rehabilitative or therapeutic goals.

Thus if a childhood behavior disorder (enuresis, for example) is the pathological behavior in question, the interference position is that of teaching broadbased responsibilities to the child, of interfering with his too self-centered approach to living, by bringing under control many aspects of his daily routine. In contrast, the psychoanalytic or non-directive positions would attempt to uncover origins (historical, cognitive) and regard such strategies as revealing the "cause" of the disturbance.

In summary, in the interference position a search is instituted to find effective means of control over the pathological processes. The older extinction studies did not have to seek origins; the origins were already known. The psychotherapist can now see that the extinction experiments were important in offering means of control, and should serve in this capacity as a model for learning theory applications to psychotherapy, rather than being placed under the too narrow interpretation involving extinction and uncovering. The cybernetic formulation of "controlling the effects" (1, 5); or the learning theory formulations concerned with controlling reinforcing conditions (6, 7, 8); or the decision theory formulations of recent origin (2)[1] might all be interpreted as supporting larger scale theoretical and logical issues emphasized in the interference theory position.

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[1] Following some implications of Luce's formulations, the question of past relevance for present decisions and actions is based not on what did happen, but what *can* (be made to) happen (2, Pp. 92-95).

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THE EFFECT OF MEPROBAMATE ON INTELLECTUAL TEST PERFORMANCE WITH AND WITHOUT STRESS*

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A. INTRODUCTION

Meprobamate as a tranquilizing drug (cf. 12) is widely used and misused by normal persons for preventing emotional and motivational stress (see 15). In the special case, when Meprobamate is used by brain workers the question arises whether it has any influence on intellectual performance. Will Meprobamate reduce intellectual performance because of its characteristics as a depressant drug? Or will Meprobamate promote performance because of its prohibitory effect on hyperexcitability, stress reaction, anxiety and fear (8, 10, 14) which, if present in testing mental abilities, may reduce intellectual performance (3, 4, 5, 13, 16)?

B. PROBLEM

To answer these questions, the following two hypotheses concerning the effect of Meprobamate on intellectual performance were to be tested: (1) According to Eysenck's drug postulate (7) suggesting that depressant drugs (as Meprobamate, see 11, 12) increase cortical inhibition, a decrease in test performance under Meprobamate may be predicted. (2) On the other hand, a decrease in test performance produced by stress should not occur after the application of Meprobamate.

The two predictions should be tested by means of a two by two analysis of variance design, one variable being Meprobamate versus placebo, the other being stress versus non-stress. For introducing a state of real stress the failure method (1, 9, 19) seemed to be most effective. So we used it in the way described below.

C. METHOD

Subjects: The *S*s of the experiment were 20 male and female students from the liberal arts and sciences department at the University of Marburg. The ages of the *S*s ranged from 20 to 40 years.

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Apparatus: Test performance was measured by the total score of the subtests of the "Intelligenz-Struktur-Test" (27) which is available in two parallel forms A and B. Meprobamate was applicated within a preference experiment, for which 12 fluids of different colors and three liquids of different tastes and colors were prepared.

Pre-test: For obtaining base level performance scores the whole group of 20 *S*s was given the IST-battery as a pre-test. Prior to testing, the *S*s had been divided at random into four subgroups of five *S*s each. Group I should receive Meprobamate and take the criterion-test under stress (M^+S^+). Group II should also receive Meprobamate but take the criterion test without stress (M^+S^-). Group III should receive a placebo and take the criterion-test under stress (M^-S^+). Group IV should also receive a placebo but take the criterion-test without stress.

Application: Meprobamate was administered to the *S*s without their knowledge in the following manner: The *S*s were asked to judge which of the 12 liquids they would prefer because of its color as a medicine. Then the *S*s were asked to drink the three liquids and to judge again which they would prefer as a medicine because of its taste. Mixed to the juice drink 800 mg. Meprobamate were given to the *S*s of the Meprobamate Groups I and II. The *S*s of the placebo Groups III and IV were given the same drink mixed with a bitter tasting placebo.

Criterion-test: After application, all *S*s were occupied by other color and smell preference tasks. Unlike the pre-test the criterion-test and the application before, were performed individually. The *S*s of the non-stress Groups II and IV now were given the parallel form of the test battery they had taken as a pre-test while being alone in the testing room. The *S*s of the stress Groups I and III at first had to take a short irrelevant informal test during which the experimenter complained about their bad performance. Not having finished this test the *S*s were sent to a senior member of the faculty and severely criticised by him. The *S*s were told that their performance was insufficient with respect to the validity of their preference judgments and that they will now get a chance for improving it. Then the *S*s of the stress groups were given the parallel form of the IST-battery (criterion-test) while supervised by the faculty member.

D. RESULTS

An analysis of variance carried out with the score differences between pre-test and criterion-test did not show statistically significant effects of any of the two factors (medication, stress). However, when the two Meprobamate groups were pooled and compared with the combined placebo groups, an increase of variance of test performance significant at the .05 level was found in the Meprobamate groups (see Figure 1).

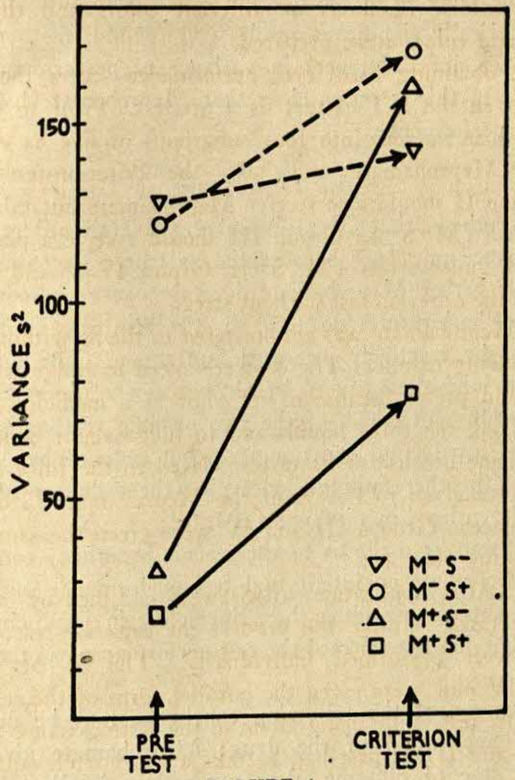

FIGURE 1
Changes of variance of test performance in the Meprobamate groups (solid lines) and in the placebo groups (dotted lines) from the pretest under control conditions to the criterion test under medication.

This result indicates that *S*s of high base level performance are likely to improve by Meprobamate while *S*s of low base level performance are likely to decrease in this respect. However, this result is not wholly conclusive since the Meprobamate groups and the placebo groups were not equivalent as to the variance of performance in the pre-test (see Figure 1).

For clarifying whether the increase of variance of test performance has been an effect of Meprobamate or an effect of initially minor variance in the pre-test, a control experiment was carried out: Instead of the IST-battery the unpublished "Wiener Abiturienten-Test" was administered to a placebo group and to a Meprobamate group, both groups of 10 *S*s each, who had been matched by a pre-test for equal means and variances. Method and analysis were the same as in the original experiment but without involving stress. No statistically significant results were found, neither differences in mean performance nor differences in variance of performance between the two groups. From this it seems clear that Meprobamate has no effects on intellectual test performance.

E. DISCUSSION

Our first hypothesis that Meprobamate as a tranquilizer inhibits intellectual performance must not be accepted as true. There are two possible reasons for this: Either Meprobamate does not cause any cortical inhibition as, for example, barbiturates do (21) or the resulting inhibition has been compensated for by reactively increased motivation. The latter mechanism was observed in inhibitions caused by alcohol as the oldest known tranquilizer (6). Regardless of which of the two possible reasons is the right one, the finding that intellectual functioning is not reduced by Meprobamate is in accordance with other findings concerning the influence of Meprobamate on analysis and synthesis in thinking (20).

No statement can be made as to the second hypothesis concerning the influence of Meprobamate on intellectual test performance under stress. The failure method applied has either been inefficient in producing stress or the stress, if produced, has not affected the test performance as other investigations have shown.

From the experiment the following conclusion may be drawn in regard to the clinical application of the drug: Meprobamate given orally in a relatively high dose of 800 mg. does not reduce intellectual performance. Of course, it does not improve it either.

F. SUMMARY

By means of two experiments it has been shown, that application of Meprobamate in a dose of 800 mg. has no influence on intellectual test performance measured by a standardized battery of tests. Thus the prediction made from Eysenck's drug postulate suggesting a decrease of performance under Meprobamate could not be verified. Another prediction, involving the concept that intellectual performance reduced by stress will be normalized under Meprobamate could not be tested because of the inefficiency of the stress producing method.

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TRANSFER MATCHING: A NEW METHOD IN PSYCHOTHERAPY*

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In this paper a new method in psychotherapy is to be proposed, one uniting the techniques currently employed separately: techniques for the indoctrination of absolute beliefs, and for the administration of electroshock. First, however, it will be necessary to present something of the background of theory against which such therapy can be meaningful. We begin with the analysis of the retention of beliefs.

A. BELIEFS: THE RETENTION SCHEMATA

Beliefs are often accepted because they are consistent with other beliefs already held. Awareness compels a need for consistency. There is pain in conflicting beliefs of which the patient is aware, and at least the discomfort of knowing that for him they are not prepared to issue in action. Beliefs consist in behavior patterns awaiting discharge, to be triggered chiefly by relevant external events. They are reinforced meanwhile by other beliefs with which they are consistent. The stronger the reinforcement the more comfortable the storage. The internal environment, the *milieu interieur,* is disturbed by conflicting beliefs and supported by consistent ones. If a problem is entertained and several solutions present themselves, it will often be the case that the one adopted offers not the best outcome but the greatest satisfaction.

There is another form of consistency among beliefs. This is the effect on the strength of a belief in one person of the fact that the same belief is accepted by many persons. It is difficult to deny and easy to believe what others believe also. Moreover, beliefs held in common by the members of a given society are beliefs in harmonic phase: they reinforce each other through resonance. Thus it is that the human organism is not a valid isolate but relies upon cultural components, chiefly symbolic communication.

When beliefs multiply, simple consistency is no longer sufficient, and a complex structure of beliefs is required in order to maintain order among

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them. The beliefs have somehow to be organized into a system, in which, of course, consistency remains the criterion. This system is the public retention schema.

By "public retention schema" here is meant a system of social beliefs interpreted as rules of procedure whereby cognition is enabled on the one hand to apply its fundamental categories to sort out the data subsequently disclosed to sense experience and on the other hand to guide behavior (2). Its contents consist in those ancient and inherited beliefs which it were considered folly to question. Such a body of "common sense" beliefs is held in common by all the members of a given culture; it is what their sanity rests on and the point of departure for their reason (3).

The conception of a public schema invites comparison with that of the private schema. Stability of behavior involves the retention of a disposition to act. But there were already other dispositions. The patient has collected a history, and the more cumulative the more determinative. From the innumerable and continuous transactions between stimulus and subject, there has emerged slowly the construction of a private retention schema. The stimulus could have been either a cultural object, i.e., a material object altered through human agency, or another person.

By "private retention schema" here is meant an unconscious set of experientially acquired and emotionally accepted and endorsed dispositional states. The private schema has a core of stability but a peripheral area of change. It requires and receives occasional reinforcement.

The elements of the two schemata, private and public, are rarely sorted. Although the private retention schema consists in those beliefs which result from specific and unique individual experience, and the public retention schema in those organized beliefs which all the individuals in a given culture hold in common, both are likely to be stored in the subconscious, retained unsorted in the memory (7). The private schema is peculiar to a given individual; the public schema is common to all the members of a given culture. The two schemata together constitute the beliefs of the individual. But there is no dead storage, as in a computer; some of the beliefs must be revised from time to time as new information is received or new relations between the bits of stored information detected. Hence the necessity for movement within the schemata.

Kant was the first to use the term, schema (6), but as employed here, it is closer to the meaning given it by Head (5) and Bartlett (1); it is however distinguished from these, also, by the emotional charge on its separate elements, by the degree of generalization of its contents, and by the tightly systematic nature of its organization. Bartlett finds the origin of consciousness in the ability of the human organism to recognize its own schema, a view which goes somewhat further than the present usage. Consciousness in the theory of the cultural circuit would be merely the doubling up of awareness, as for instance in the recognition of perception.

With the public retention schema is initiated the formalization of the process of axiom-acquisition. This is accomplished in one of two ways: either by recognizing in events the compulsion to beliefs of a critical sort, beliefs capable of serving as axioms in a system; or by recognizing among the beliefs already held those which are more important and so capable of serving as axioms for the deduction of the others. To incorporate a belief into a system of beliefs is another form of reinforcement. Beliefs gain strength from the support of other beliefs, and doubt is thereby rendered less probable. It is difficult to single out one element of a complex for possible rejection without involving other elements; the elements are stronger for being parts of a whole. Every belief radiates outward to logically proximate similar propositions. There is a disposition to believe all propositions of the same class.

We shall see that the effect of the relation of beliefs is widespread and intense. First of all, however, it is necessary to consider the degrees of tenacity of belief. These range all the way from the most casual observations which pass through consciousness lightly without being remembered afterwards, such as passing thoughts, to those ultra-stable dispositional states which are held unconsciously in the memory but are capable of instigating visceral reactions at any time, such as metaphysical beliefs (10). Beliefs tend to persist. The stronger the belief the more tenacious. There is an order of increasing intensity, for instance a belief of which the subject is not at all sure; one into which he is prepared to inquire further; one on which he is prepared to bet money; one for which he is willing to take greater chances; one on which he could be asked to risk his life; one for which he is ready to die; one which he is incapable of denying; one of which he is unaware; and one of which he cannot be made aware.

B. Beliefs and Action

The final outcome of thought of whatever variety is a network of beliefs, the retention schemata. These are stored in the memory where they are available to releasing mechanisms. The function of releasing mechanisms is to connect up events with relevant beliefs. Too often it is forgotten that specificity of response follows specificity of stimulus (9), and the stimulus left vague and unspecified in an analysis of the response situation. We have noted already that beliefs are propositions on which the feelings bestow a disposition to act. A set of beliefs, then, is a learned behavior pattern which by means of interaction with material objects or by means of inter-personal relations has been added to the already existing set of innate behavior patterns. The weakest beliefs are capable of firing only vague inclinations to action, and consist in convictions quite easily dispensed with, while the strongest have a compulsive character and carry an emotional charge.

Not all beliefs, of course, lead directly to action. All are prepared to do so, but not all are called on by relevant events. Activity is the response to events, an effort to render beliefs objective in a context in which they can be relevant. Where beliefs conflict, the disposition to act becomes thwarted: one activity is no more and no less relevant than its opposite. Competing beliefs constitute an interference, efferent impulses cancelling afferent. Where the schemata are consistent, there is no problem, and the activity occurs as the contents are elicited. But where the schemata exhibit inconsistency, either within themselves separately or between private and public sets, then action is inhibited.

Pathology in a word is subjectivity. When an individual encounters a conflict between his retention schemata and events, he refuses to give up the schemata and hence withdraws from the world of events. Issues between acting and knowing are settled in favor of knowing, but this can be accomplished only by shifting from the world in which action occurs to the one in which knowing occurs. The occasional procedure of introspection becomes the customary behavior. Learning from experience means revising the schemata in terms of new information; but now the schemata are no longer to be revised. The neurophysiological and the psychological organism continues, however, to live in a world of events. Stresses are produced upon the individual and strains result, the "catastrophic response" (4), with its inevitable pathological consequences.

There follows a breakdown in the structure of goal-seeking. Thus where becoming a normal adult had meant using the self to produce effects on the world, becoming a pathological adult now means using the self to produce effects upon the self which are detrimental; the result is the same kind of subjectivity which was originally the normal mental state of the child. This explains the resemblance in the Freudian account between the psychotic and the infantile. The external world with its material objects and interpersonal relations is shut out because the adjustments within the oganism do not permit it to be faced in that direction. Instead, there is a concentration within the self. The greatest intensity of activity is taking place there, but at lower levels. Excitation at a lower level may inhibit functioning at a higher. Centrally aroused sensations become hyperactive in inhibiting the reception of stimuli. When the whole effort of which an organism is capable is devoted to homeostasis, the effects of all further stimuli take on a nociceptive character.

A deep feeling of insecurity compels the effort at resolution, and there is no left-over attention to turn outward. Hence the subject in this state is indifferent to events around him and he cannot be moved. The dependence shifts to the conflict, which then becomes necessary; and the conflict-dependent reaches an adjustment as a kind of equilibrium neurotic: stabilized on a balance involving high tension.

Beliefs formerly held on evidence are now held for their stability effects. The inherently extended nature of experience leaves a residue of generality which has to be resolved. It cannot be supported as free-floating by the pathological personality, for it, too, challenges stability. Where stability maintained was a natural condition hardly regarded by the individual as it occurs in a supportable state furnished by the equilibrium between his drives and his goals, stability lost becomes a state very much the object of awareness and of desire. Consequently, the nearest equipment is seized upon and a synthetic equilibrium attempted. Prejudices are ready to hand where beliefs are unavailable. A prejudice is a belief held despite its conflict with another belief for which there is stronger evidence. With the equilibrium based on the balance between drive and external object interrupted, the attainment (or restoration) of equilibrium itself has become the drive. In the neurotic, equilibrium is restored by freezing beliefs in conflict, one or more of which may be prejudices in the sense defined above.

In a normal individual, the public retention schema takes precedence over the private; in a pathological individual the private retention schema struggles for precedence. Public retention schemata are rationally founded. Private retention schemata vary from individual to individual and are emotionally founded. But when the activity of the individual becomes subjective, the emotionally over-determined efforts to replace the lost equilibrium appeals to just those elements in experience in which emotion had prevailed over reason. Thus the effort at ascendency of the private schema over the public schema has serious effects. There is compulsive behavior and there is emotional acceptance of the public schema.

There is nothing wrong *per se* with what is called obsessive or compulsive behavior. The fear of conscience in what Freud called the compulsive type of individual is only one who has substituted a subjective element (conscience) for an objective element (the love object). Compulsive behavior is not regarded as over-determined when the goal is a socially-approved and accepted element of the public schema. What is wrong—when it is wrong—is the type of element, which has become a subjective one, an equilibrium of prejudices, for instance. Compulsive behavior, in short, is only pathological when it is based on a drive toward some pathological object.

The emotional acceptance of a public schema may involve the immediate and absolute acceptance of entire systems of ideas at some deep level where they can hardly be challenged. The type of belief in such cases is commensurate with the type of acceptance. For instance, absolute beliefs are adopted under conditions of extreme emotional stress. Sargant has studied this phenomenon (8). He draws a parallel between the shock induced in Pavlov's dogs, religious conversions, and the "brain-washing" of the Chinese communists.

The familiar pathological divisions may be looked at from this perspective. The neurotic is one in whom the conflict between private and public retention schemata has become active. The private schema has challenged the public schema. The struggle has caused a partial withdrawal from external preoccupations; that is why there are often emotional disturbances in such cases, "unfocused anxiety," for instance. The emotions are not unfocused; they are focused on an internal object. There is a substitute equilibrium established between mutually exclusive drives or appetite and aversion. The anxiety neurotic makes no decision. He is transfixed by an unresolvable conflict, caught in a closed loop, and can only go round and round with it. He is not compulsive, he is enmeshed. There is no refusal to adapt, only an inability.

The psychotic is one in whom the conflict between the private and public schemata has been settled; only, the private schema has prevailed over the public schema. The schizophrenic suffers from schematic disorganization, with the dominance of the private schema. The manic depressive suffers from rigid determination by the private schema. The withdrawal from the external world is now complete; there is no more correspondence with reality. Private retention schemata are no longer called upon to withstand the shock of the discovery that they contain beliefs incorporating false propositions. Consistency is still required on which to rest a sense of reality. But the sense of reality can now be satisfied internally. The internal world is the real world for the psychotic, and if he is concerned with the external world at all it is only because he has incorporated it in his own world. He is occupied with maintaining an all-embracing solipsism.

C. THE METHOD OF TRANSFER MATCHING

The theory of therapy can be arrived at deductively from the foregoing account of normal and pathological individuals. If for instance it were conceded to be true that pathology is subjectivity, then therapy would be objectivity. In the case of a subjectively-oriented patient, how is objectivity to be restored?

It will be necessary to reorient the individual toward the external world. We must in fact make the adjustments necessary to reconstruct his equilibrium so that it depends upon a balance between his drive and some external goal: either a material object or an inter-personal relation. How is this to be accomplished?

Therapy at the cultural level is more strongly rational. It has been practiced successfully by depth psychology, and, in the upside down anatomy in which all schemata are held in the unconscious, it consists in the effort to probe by means of a long series of interviews through the conscious defenses of the privately-held schema by reaching past the theorematic beliefs to the axiomatic beliefs on which they rest. For it is only by restoring to consciousness not only the axiomatic beliefs but also the exact emotional occasions on which they were adopted that we can hope to show that the beliefs themselves do not correspond with the reality of the external world.

Another approach, however, is possible. The organization of the schemata as maintained in the pathological individual can be reversed, and the ascendency of the public retention schema over the private restored. Considerable forces will have to be brought into play if the rigid structure guarded by the equilibrium neurotic is to be smashed and the elements reassembled.

The method is called transfer matching, and the steps are as follows. First, the structure and content of the patient's pathological schema are studied; next this private schema is matched morphologically with a public schema; then some emotional occasion is found for the substitution of public for private schema.

The emotional occasion needs to be a strong one. Electric or chemical shock could be combined with the inculcation of commonly accepted ideas, similar to the way in which an active role for the therapist is often employed in narcoanalysis. It can be assumed that a public retention schema has already carved out channels; it was once accepted by the patient. Therapy of this sort, therefore, would amount to a restoration of familiar habit patterns, like reviving a shattered memory in the midst of familiar surroundings. Tensions can be created by teams of discussants, together with suggestions of personal danger. There is some resemblance here to the forced conversions of communism or to the voluntary revivalist religious conversions, only this time the public schema is the scientific philosophy of truths and facts.

It is curious that, at the present time, shock techniques are employed yet expected to accomplish their therapy though empty of content. The patient is shocked into a state in which anything could be accepted but the method ends there, and he is provided with nothing for acceptance. He is left devoid of suggestion at a stage where he needs most urgently to be informed. Admittedly, preparing a calendar of beliefs suitable for adoption will be a matter of the utmost difficulty. We shall need to discover and perhaps to agree upon a system of propositions comprising the most urgent items which we accept in our own culture, and the problem will be different for every culture. Then there is the technique of input to be worked out; some deliberate procedure for programming the patient.

Perhaps, in the therapeutic session following electroshock, the presentation of the ideas which it is required that the patient shall accept must be made repeatedly, but with as much variety as possible: the same ideas but in different linguistic expressions. A succession of therapists may be necessary, so that in addition to the variety of language there is a variety of voice and intonation as well as of personality. Then, too, teams may be necessary to cover the required temporal span adequate for secure input. Other stimuli during these sessions should be held to a minimum.

Confinement serves to block other channels of expression and hence lends to the situation the added property of displacement behavior. The restoration of the public retention schema and the consequent subordination of private should restore normal discharge functions to their proper channels. Innate behavior patterns peculiar to specific beliefs could find their own paths, and displacement behavior would tend to disappear.

What we are after of course is a reconstituted equilibrium between drive and external goal, and we wish to reverse the substitution which had been made in his case of an equilibrium based on a balanced internal conflict (two goals suspended on a choice point). The problem is how to redirect the drive toward an external goal. No approach can be made in such cases through the reason. But it may be possible to work backward: to so direct action that a will trained by it could strengthen the character.

Therapy somehow needs to provide a shift from an internal to an external focus, and along with it a fixation on the future rather than the past. Degrees of intensity of feeling greater than simple acceptance, such as accompanies the concentrated perception of a particular sense datum, would have to be attached to propositions having some relevance to the future.

The external world upon which the patient is to be directed consists in many concentric circles. There is the available environment which the patient himself could immediately affect and which for pathological reasons he supposes is all that affects him. Freud was concerned with an externalization of the patient's focus upon this world. Adler had a somewhat broader conception, and wished to focus the patient not upon what is but what ought to be—upon the ideal. Yet this ideal was somehow conceived in attainable terms, and so the patient was given a workable goal if a short-lived one. But there is a wider external world, and we are immersed in it. In the conception being advanced here, the external focus is the world, all of it. Hence the final ambition in therapy is what we might for want of a better word call philosophical feelings, feelings which carry with them cosmic assurances, the assurances that any legitimate thing, however small, is some small part of the whole world, and that consequently it will be well with us.

Beliefs feel good and strong beliefs feel better. It becomes a question, then, of how much the neurological equilibrium relies upon the feelings. The most compelling feelings are those called out by particular rational systems. On this basis rest all the organized world religions and political systems. If a method can be provided for substituting in the next stage of abstraction a feeling for reason as such, the effect will be overwhelming; there is no emotion more powerful than the emotion of reason. It takes a strong stomach to live on the hard fare which reason can provide when beliefs are limited to logic and facts, but in the long run a healthier individual is bound to result.

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THE VALUES OF UNITARIAN-UNIVERSALIST YOUTH*

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The present investigation is an outgrowth of a study done in 1952 under the title "The Values of the Post-War College Student," in which using a population of 1,328 students (divided into groups according to religious faith), the author found no significant differences between Protestant and Catholic students, but found Jewish students to have, "a significantly higher *aesthetic* value than either Catholics or Protestants, a significantly higher *theoretical* value than Protestants, and a significantly higher *social* value than Catholics" (3). At the same time the Jewish students were significantly lower than either of the other groups on *religious* values. At the time the author had wanted to subdivide the Protestant groups into their various denominations and see what differences might emerge.

Specifically the purpose of the present study is to find what is the value pattern of Unitarian-Universalist young people. Since the test was to be given to junior high and senior high school students the Levy Modification of the Allport-Vernon-Lindzey *Study of Values* was used by arrangement with Houghton Mifflin Company. This modification is intended for these age levels.

One thousand one hundred and seventeen tests were secured, the tests being given in 51 churches in 27 states, and administered by the director of religious education or minister or some other qualified person. One hundred and ten tests had to be discarded because they were given to the wrong age group, to other than Unitarian-Universalist youth, or because they were incorrectly or incompletely taken. This left a total of 1,077 tests to be tabulated.

The tests were first sorted according to male and female liberals, the sex difference being important because the norms are established in this way. The averages for each, and comparison with the Levy Norms, are shown in Table 1.

As is clear from Table 1 both liberal males and liberal females differ from the norms at the 1 per cent level of confidence with the exception of

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liberal males on the political value. There thus emerges a clear pattern in which both liberal males and females hold a statistically different pattern of values from the normal population, high on *theoretical, aesthetic,* and *social* values, and low on *religious* values. This is the same pattern by which the Jewish students in the study already mentioned differed from the Catholic and Protestant patterns of that study. (In that study the above average scores of Catholics were *religious, political* and *economic,* and the above average scores of Protestants were *religious, political, social,* and *economic.*)

TABLE 1

Value	Norm	Liberal Males	t-ratio	level significance
		Male Liberals and Levy Norms (Number 477)		
Theoretical	39.73	43.36	10.40	1%
Economic	40.19	37.90	6.03	1%
Aesthetic	40.61	42.89	6.27	1%
Social	39.89	41.22	3.87	1%
Political	39.66	39.89	.72	—
Religious	39.89	34.68	12.15	1%
		Female Liberals and Levy Norms (Number 600)		
Theoretical	40.05	44.27	12.64	1%
Economic	39.94	35.37	14.78	1%
Aesthetic	40.37	45.02	13.37	1%
Social	40.28	42.23	5.99	1%
Political	39.82	38.87	3.46	1%
Religious	39.51	34.59	13.32	1%

The second question was whether this "liberal pattern" would be true of both Universalists and Unitarians, that is would each group taken separately differ from the norms in the same way? And, a second part of the question, would they be the same, or would they differ from each other? Table 2 presents the facts for the first part of the question, the separate tabulation of Universalists and Unitarians, with each compared to the Levy Norms.

With four exceptions, out of 24 comparisons, it can be seen from Table 2 that the "liberal pattern" found for the total group holds for each denomination taken separately. Two of the exceptions are the political value of both Unitarian and Universalists males (which was also not significant for the total group); so that the two real exceptions are the fact that male Universalists do not differ significantly in social values, and female Universalists do not differ significantly in religious values. Overwhelmingly the evidence is then that both Universalists and Unitarians hold this "liberal pattern" which is so strikingly similar to the Jewish pattern of the original study. To those who are familiar with the denominations in question this is not a surprising fact.

TABLE 2

Value	Norm	Universalist male	t-ratio	level of significance
		Male Universalist and Levy Norms (Number 155)		
Theoretical	39.73	41.42	3.12	1%
Economic	40.18	38.32	3.50	1%
Aesthetic	40.61	43.46	5.41	1%
Social	39.89	40.80	1.67	—
Political	39.66	40.33	1.24	—
Religious	39.89	37.47	3.48	1%
		Male Unitarian and Levy Norms (Number 303)		
Theoretical	39.73	44.32	10.79	1%
Economic	40.18	37.44	5.50	1%
Aesthetic	40.61	43.56	6.39	1%
Social	39.89	41.42	3.49	1%
Political	39.66	39.69	.07	—
Religious	39.89	35.82	8.06	1%
		Female Universalist and Levy Norms (Number 186)		
Theoretical	40.05	42.34	4.57	1%
Economic	39.93	36.93	6.51	1%
Aesthetic	40.36	42.67	4.27	1%
Social	40.27	41.68	2.72	1%
Political	39.82	38.26	3.49	1%
Religious	39.50	38.50	1.73	—
		Female Unitarian and Levy Norms (Number 384)		
Theoretical	40.05	44.30	10.75	1%
Economic	39.93	34.02	15.85	1%
Aesthetic	40.36	46.29	13.87	1%
Social	40.27	42.37	5.25	1%
Political	39.82	39.16	1.97	5%
Religious	39.50	32.72	16.04	1%

But equally important if the two denominations are to be studied carefully is the question as to whether or not they differ from each other in spite of the similarity of difference from the norm. These calculations are presented in Table 3.

Male Unitarians and Universalists differ significantly from one another on two values, the Unitarians having higher *theoretical* values and the Universalists having higher *religious* values. Female Universalists differ from each other significantly on four of the six values measured: the Unitarians having higher *theoretical, aesthetic* and *social* values, and the Universalists having higher *religious* values.

Thus, it can be seen that taken as a whole Unitarian and Universalist, although deviating from the norm *in the same direction,* at the same time differ from one another, with the Universalists tending to be more like the Protestant-Catholic group of the original study, and the Unitarians tending to be more like the Jewish group. The conclusion would seem to be that while the pattern is definite and consistent, and statistically significant, the Unitarian youth tends to be somewhat more "liberal" than the Universalist youth.

TABLE 3

Value	Unitarian male	Universalist male	t-ratio	level of significance
	Comparison Male Unitarian-Universalist (No. 393 Unitarian, 155 Universalist)			
Theoretical	44.32	41.42	5.05	1%
Economic	37.44	38.32	1.25	—
Aesthetic	43.56	43.46	.15	—
Social	41.42	40.80	.93	—
Political	39.69	40.33	1.21	—
Religious	35.82	37.47	2.00	5%
	Comparison Female Unitarian-Universalist (No. 384 Unitarian, 186 Universalist)			
Theoretical	44.30	42.34	3.24	1%
Economic	34.03	36.93	5.16	1%
Aesthetic	46.29	42.67	5.52	1%
Social	42.37	41.68	1.11	—
Political	39.16	38.26	1.70	—
Religious	32.72	38.50	8.35	1%

In the original study it was asked if the meaning were not perhaps to be put in these terms: in spite of their low religious scores Jewish students are perhaps not "less" religious, but rather they may be "differently" religious, with what for them are religious values couched in terms of theoretical, aesthetic, and social values. This question can be asked with equal validity in connection with the present study of Unitarian-Universalist youth. If this be true, what is this "differently" religious meaning?

There are two studies which might be taken into consideration here that help to explain the value pattern found for liberal youth. The first is one done by Dr. Hubert E. Brogden using a factor analysis approach (1). Brogden found a factor which he called "Factor B" in his study of the Allport-Vernon test, where low economic and political values tended to be found along with above average theoretical, social, and aesthetic values. He describes the person scoring high on "Factor B" as follows (p. 25):

> "Persons scoring high on Factor B may be characterized as idealistic, . . . individuals who evaluate highly concepts and beliefs which are aimed at the solution of the problem of the ideal society structure, the ideal manner of life, and who evaluate highly those aspects of our present day and past cultures which they believe to be improvements over the usual, accepted, or conventional set of values."

Certainly the man on the street who often refers to these denominations as an "ethical religion," and indeed many of the members of the denominations in question themselves, would accept this as a description of "liberal religion." And it takes no particular stretch of imagination to say that a person holding these high values *is,* in some sense of the word, "religious."

This whole matter of defining the word religious is, as any social scientist knows, a tricky one. Dr. Walter H. Clark (2) has done a questionnaire study of the definitions of social scientists in this matter of religion, and found that they mean many things when they use this word "religious." He found six differing types of definition: (1) Concepts of the supernatural, spiritual non-material; (2) Concepts regarding ultimates or the ultimates; (3) Definitions involving group concepts; (4) Ideas concerning the institutional and creedal; (5) Ideas emphasizing theology; and (6) Ideas of interaction between the inner and outer aspects of life. As he says in his first conclusion (a, p. 146):

> "Social scientists may mean very different things by the term 'religion.' Contrast religion as ritual with religion as interaction between man and his environment; or religion as an experience of the supernatural with religion as whatever meaning a person might find in his life."

If all of these things be religion, then it is not difficult to conclude that liberal youth are religious even when scoring low on religious values, but are indeed "differently religious" from the norm. In the test for example an individual would fail to gain a religious score if he sees the Bible as beautiful mythology with a high literary style, rather than as a spiritual revelation; if he believes that churches should bring out altruistic tendencies rather than "communion with the highest;" or if he believes that unselfishness and sympathy are more important than high ideals and reverence. Obviously from the pattern value of our liberal youth these are choices they would have made.

Since another question is the source of these values, and one possible approach is the correlation of parent-child value tests, it is important to know what the value pattern of adult religious liberals may be. Tests were secured from 254 religious adults, and from 31 of the professional directors of religious education in these churches. The average scores of these tests are tabulated in Table 4.

TABLE 4

Value	Average Score
Adult Religious Liberals (No. 254)	
Theoretical	44.72
Economic	33.02
Aesthetic	42.93
Social	42.11
Political	37.87
Religious	39.30
Directors Religious Education (No. 31)	
Theoretical	44.9
Economic	25.7
Aesthetic	48.1
Social	42.2
Political	36.0
Religious	43.1

Adult Unitarian and Universalists hold highly similar values to those of the liberal youth, their high values being *theoretical, aesthetic,* and *social,* and their *religious* score being (although only slightly) below average. For the directors of religious education (this sample including 45 per cent of the members of their professional group) the same high values hold as for adults, but the directors have a well above average score on *religious* values. This is not surprising, however, for this group since religious work is their professional orientation, and might well influence some of the choices they would make in a test that is based entirely on choice situations. With this one exception the "liberal pattern" does pertain to adults as well as to youth.

We then set out to do a correlation study of father-son and mother-daughter pairs. There were not as many cases for this as has been hoped for, due to the fact (it will be recalled the tests were sent out by mail and given in the local churches) that the purpose of the adult tests was not clearly understood and in many cases the pairs were tested, but the tests were not marked so that one knew which of the young people belonged with which adult. However, 61 pairs of father-son, and 92 pairs of mother-daughter tests were returned with the relationship clearly indicated and these were correlated. Table 5 shows these correlations.

It takes only a glance to see that none of these correlations is significant, and that only the religious values even approach the lowest kind of significance. In short it can be said that there is practically no correlation at all between father-son and mother-daughter values. This is surprising in view of the many attitude studies showing high positive parent-child correlations, and also in view of the strong similarity in the youth and adult patterns of Unitarians and Universalists. It occurs to us, too late to do it at this juncture that the value patterns of parent-child may be more strongly related in unlike-sexed pairs, and that we should have compared father-daughter and mother-son scores. Certainly this should be done at some future time.

TABLE 5

Value	Correlation
Father-Son Correlations (No. 61 pairs)	
Theoretical	+.097 ± .085
Economic	+.156 ± .084
Aesthetic	+.055 ± .086
Social	—.092 ± .085
Political	+.071 ± .085
Religious	+.297 ± .078
Mother-Daughter Correlations (No. 92 pairs)	
Theoretical	+.186 ± .068
Economic	+.233 ± .066
Aesthetic	+.242 ± .066
Social	+.158 ± .068
Political	+.215 ± .068
Religious	+.317 ± .063

Another approach, in this matter of studying the sources of the values (and an equally fruitless one) was to correlate the number of years each child had been under the denominational curriculum and the strength of each value. The Unitarian and Universalist denominations have a unique curriculum which is widely used in all of their churches. But the results of this correlation were even less fruitful than that of the parent-child study, as can be seen by a study of Table 6.

This whole area of the sources of the value system certainly requires further study, and probably cannot be done without instruments having more depth than the *Study of Values* or any other non-projective approach.

Since the churches had been carefully selected to represent a wide variety of geographic areas, it seemed worthwhile to make a careful comparison of

TABLE 6

Value	Correlation
Males: Years Under Curriculum and Strength of Values (No. 384)	
Theoretical	—.001 ± .034
Economic	+.009 ± .034
Aesthetic	+.096 ± .034
Social	+.007 ± .034
Political	—.029 ± .034
Religious	+.092 ± .034
Females: Years Under Curriculum and Strength of Values (No. 535)	
Theoretical	—.012 ± .027
Economic	+.042 ± .027
Aesthetic	—.175 ± .027
Social	—.218 ± .026
Political	—.074 ± .027
Religious	+.109 ± .027

TABLE 7

MALES ACCORDING TO GEOGRAPHIC LOCATION

Value		Middle Atlantic	New Eng.	South	West Coast	Middle West
Theoretical		43.20	41.66	43.59	46.22	42.68
	σ	6.52	6.00	7.28	7.32	6.88
	σ_m	.75	.63	1.21	.96	.52
Economic		38.40	37.21	36.72	36.56	38.41
	σ	7.40	6.92	7.04	9.60	7.92
	σ_m	.85	.73	1.17	1.26	.60
Aesthetic		42.40	40.61	43.26	44.50	43.50
	σ	6.64	6.16	7.40	5.68	7.20
	σ_m	.76	.65	1.23	.75	.55
Social		39.94	41.86	43.73	40.98	40.38
	σ	7.00	6.76	6.40	6.92	7.12
	σ_m	.81	.73	1.06	.91	.54
Political		40.66	40.43	37.18	38.84	40.34
	σ	6.36	6.72	5.32	6.24	6.16
	σ_m	.73	.71	.89	.83	.47
Religious		34.40	38.07	35.62	33.19	33.14
	σ	9.72	7.48	7.76	6.84	8.44
	σ_m	1.12	.77	1.29	.90	.64

Number:

Middle Atlantic	75
New England	93
South	36
Pacific Coast	58
Middle West	175

the value systems by area. The thought was that perhaps some particular area was influencing the total results.

Tables 7, 8, 9, and 10 show the results of these breakdowns into geographic areas, the first two tables dealing with the males and the second two with the females in this study.

For males there is no single geographic region which is distinctively different, but there are geographic differences for all except *economic* values. These can be summarized as follows:

> On *theoretical* values the Pacific Coast is higher than the Middle Atlantic, New England or the Middle West.
>
> On *Aesthetic* values the Pacific Coast is higher than the Middle Atlantic or New England, while the Middle West is higher than New England.
>
> On *social* values the South is higher than the Middle Atlantic or the Middle West.

TABLE 8

SIGNIFICANT GEOGRAPHIC DIFFERENCES: MALE

Theoretical t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	1.62	2.48 *2%*	.57	.27
N.E.		—	3.96 *1%*	1.26	1.41
P.C.			—	3.25 *1%*	1.70
M.W.				—	.61
S.					—

Economic t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	1.07	1.20	.01	1.16
N.E.		—	.44	1.28	.35
P.C.			—	1.33	.09
M.W.				—	1.21
S.					—

Aesthetic t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	1.79	2.06 *5%*	1.17	.59
N.E.		—	3.95 *1%*	3.40 *1%*	1.91
P.C.			—	1.07	.89
M.W.				—	.18
S.					—

Social t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	1.76	.85	.45	2.85 *1%*
N.E.		—	.76	1.62	1.45
P.C.			—	.55	1.96
M.W.				—	2.81 *1%*
S.					—

Political t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	.19	1.65	.37	3.02 *1%*
N.E.		—	1.55	.11	2.85 *1%*
P.C.			—	1.57	1.37
M.W.				—	3.12 *1%*
S.					—

Religious t-ratios
Significance level

	M.A.	N.E.	P.C.	M.W.	S.
M.A.	—	2.69 *1%*	.84	.98	.71
N.E.		—	4.14 *1%*	4.93 *1%*	1.53
P.C.			—	.05	1.60
M.W.				—	1.72
S.					—

> On *political* values the South is lower than the Middle Atlantic, New England or the Middle West.
>
> And on *religious* values New England is significantly higher than the Middle Atlantic, Pacific Coast, or the Middle West.

For females New England emerges as the geographic area with a distinct difference from the other areas studied. Fifteen of the 20 significant differences involved New England.

> New England is significantly less *theoretical* than the Middle West, the Middle Atlantic or the Pacific Coast. New England is higher on *economic* values than the South, Middle West or Pacific Coast. New England has lower *aesthetic* values than the South, the Middle West, or the Pacific Coast. And finally New England is higher on *religious* values than the South, the Middle West, the Middle Atlantic, and the Pacific Coast.

TABLE 9

FEMALES ACCORDING TO GEOGRAPHIC LOCATION

Value		Middle Atlantic	New Eng.	South	West Coast	Middle West
Theoretical		44.66	42.50	44.22	45.06	45.06
	σ	7.24	4.40	5.88	6.88	6.92
	σ_m	.76	.36	.98	.79	.49
Economic		36.18	36.46	33.62	33.70	34.98
	σ	6.52	5.92	5.84	6.60	6.96
	σ_m	.69	.49	.97	.76	.49
Aesthetic		43.78	42.38	45.74	46.30	46.90
	σ	6.96	6.96	6.68	8.72	7.48
	σ_m	.73	.58	1.11	1.01	.53
Social		41.90	42.18	43.14	42.18	41.70
	σ	7.64	7.20	7.76	6.96	7.64
	σ_m	.81	.60	1.29	.80	.54
Political		38.82	37.74	38.30	40.03	39.58
	σ	6.16	5.56	5.40	5.92	6.16
	σ_m	.65	.46	.90	.68	.44
Religious		33.78	38.86	35.26	32.38	31.82
	σ	8.00	7.40	7.48	8.00	7.60
	σ_m	.84	.61	1.24	.92	.54

Number:

Middle Atlantic	91
New England	147
South	37
Pacific Coast	75
Middle West	198

There seems no question, in view of the deviations of New England from the other regions, and the nature of those deviations, that New England is the least typical in its "liberal pattern" of any area. However, it must be noted that New England females, as seen in Table 9 still hold that pattern.

The other five significant geographic differences were these:

> On *economic* values the Middle West was higher than the South, and the Middle Atlantic was higher than the Pacific Coast.
>
> On *aesthetic* values the Middle Atlantic was lower than the Middle West or the Pacific Coast.
>
> Finally, on *religious* values the South was higher than the Middle West.

We have seen what we have called a "liberal pattern," high aesthetic, theoretical, and social values with low religious values, in the Unitarian and Universalist youth whether divided by sex, by denomination, or by

TABLE 10

SIGNIFICANT GEOGRAPHIC DIFFERENCES: FEMALE

	N.E.	S.	M.W.	M.A.	P.C.
	Theoretical t-ratios *Significance level*				
N.E.	—	1.65	4.20 *1%*	2.57 *2%*	3.46 *1%*
S.		—	.77	.35	.67
M.W.			—	.44	0
M.A.				—	.47
P.C.					—
	Aesthetic t-ratios *Significance level*				
N.E.	—	2.69 *1%*	3.69 *1%*	1.61	3.38 *1%*
S.		—	.94	1.46	.37
M.W.			—	3.36 *1%*	.53
M.A.				—	2.03 *5%*
P.C.					—
	Political t-ratios *Significance level*				
N.E.	—	.56	2.37 *1%*	1.37	2.79 *1%*
S.		—	1.26	.47	1.53
M.W.			—	.97	.55
M.A.				—	1.30
P.C.					—
	Economic t-ratios *Significance level*				
N.E.	—	2.61 *1%*	2.01 *5%*	.33	3.06 *1%*
S.		—	1.25	2.15 *5%*	.13
M.W.			—	1.43	1.42
M.A.				—	2.43 *2%*
P.C.					—
	Social t-ratios *Significance level*				
N.E.	—	.67	.59	.27	0
S.		—	1.03	.81	.63
M.W.			—	.21	.50
M.A.				—	.25
P.C.					—
	Religious t-ratios *Significance level*				
N.E.	—	2.61 *1%*	8.69 *1%*	4.88 *1%*	5.89 *1%*
S.		—	2.55 *2%*	.99	1.86
M.W.			—	1.87	.48
M.A.				—	1.12
P.C.					—

geographic area, and we have seen the pattern hold also in the limited adult groups tested. Two possibilities remain which need investigation: that perhaps these are developmental differences we have found, and they are more related to the junior high and senior high age than to the religious grouping; and secondly, that they might be social-class differences due to parental occupation. We therefore decided to investigate these two possibilities.

TABLE 11

VALUE SYSTEMS OF LIBERAL YOUTH BY GRADE

Grade	Theor.	Econom.	Aesth.	Social	Polit.	Relig.
			Male Values by School Grade			
Seven (No. 107)	43.62	38.95	42.34	41.70	40.17	34.72
Eight (No. 105)	43.64	38.08	42.16	41.51	40.40	33.97
Nine (No. 85)	44.61	37.70	42.59	41.32	39.35	33.56
Ten (No. 54)	43.24	38.80	42.13	42.43	40.43	33.24
Eleven (No. 55)	41.49	35.08	45.70	41.41	38.70	36.82
Twelve (No. 54)	42.50	35.84	45.08	38.70	38.86	37.70
			Female Values by School Grade			
Seven (No. 134)	43.94	35.54	43.58	41.66	39.78	35.42
Eight (No. 154)	44.34	36.60	43.28	42.25	39.18	33.88
Nine (No. 110)	43.99	35.48	44.21	43.15	38.83	34.79
Ten (No. 77)	45.46	36.00	47.23	41.25	37.98	34.08
Eleven (No. 69)	42.62	33.69	47.72	43.25	38.72	34.44
Twelve (No. 40)	44.80	31.80	47.50	42.20	38.30	35.90

Consequently the tests were resorted and retabulated so that they could be studied according to the year in school. These results are presented in Tables 11 and 12.

In Table 12 that for males (again excepting political values which have not differed consistently for them) the only deviation from the "liberal pattern," is at grade twelve where the *social* value is below normal. For females there were no deviations from the general pattern at any grade level. It therefore seems quite clear that whatever pattern we have found emerging arises out of the religious orientation and not out of the developmental factors associated with school grade.

TABLE 12

VALUE SYSTEM OF LIBERAL YOUTH, JR. SR. HIGH COMPARED

Value and Level	Mean	Sigma	Sigma Mean	Sigma Diff.	t-ratio	Signif. Level
Comparison Junior and Senior High Males (No. 297 Junior High, 163 Senior High)						
Theoretical						
Junior High	43.94	6.68	.38	.71	1.89	—
Senior High	42.60	7.04	.60			
Economic						
Junior High	38.27	7.00	.41	.77	2.09	5%
Senior High	36.66	8.28	.65			
Aesthetic						
Junior High	42.04	7.00	.41	.71	3.21	1%
Senior High	44.32	7.52	.59			
Social						
Junior High	41.54	6.36	.31	.60	.80	—
Senior High	41.06	6.48	.51			
Political						
Junior High	39.66	6.56	.38	.62	.21	—
Senior High	39.53	6.32	.49			
Religious						
Junior High	33.96	8.20	.49	.84	2.30	5%
Senior High	35.90	8.72	.68			
Comparison Junior and Senior High Females (No. 398 Junior High, 186 Senior High)						
Theoretical						
Junior High	44.24	6.84	.34	.62	.66	—
Senior High	44.65	7.08	.52			
Economic						
Junior High	35.94	6.68	.33	.62	4.32	1%
Senior High	33.26	7.24	.53			
Aesthetic						
Junior High	43.63	7.20	.36	.71	5.41	1%
Senior High	47.47	8.36	.61			
Social						
Junior High	42.37	6.76	.34	.70	.58	—
Senior High	41.96	8.36	.61			
Political						
Junior High	39.10	6.28	.31	.55	1.16	—
Senior High	38.46	6.08	.45			
Religious						
Junior High	35.25	7.28	.37	.71	1.00	—
Senior High	34.54	8.32	.61			

Although not connected with our particular problem in this investigation it seemed worthwhile to find what differences there were that were due to grade level, and these are shown in Table 12. Because of the smaller number of senior high school students all senior high students were compared with all junior high students, rather than a grade by grade comparison. For males there were three significant differences, although two were only at the 5 per cent level of confidence. Senior high students tended to have lower *economic,* and higher *aesthetic* and *religious* values. For females there were only two, the senior high girls having lower *economic* and higher *aesthetic* values. This obviously gives one consistent senior-junior high change, a lowering of practicality with a concomitant rise in aesthetic evaluation. It does not seem surprising that these two should vary together, nor that the senior high school students should change in the direction that they do.

TABLE 13
PER CENT AT EACH CLASS LEVEL BY FATHER'S OCCUPATION FOR UNITARIANS AND UNIVERSALISTS

		Unitarian		Universalist	
	Class	Number	Per cent	Per cent	Number
I	Professional	318	54.3%	28.8%	86
II	Managerial	142	24.2%	25.1%	75
III	Sales and Clerical	78	13.3%	18.0%	54
IV	Skilled	43	7.3%	24.7%	74
V	Semi- and Unskilled	4	.7%	3.4%	10

At Professional level
t-ratio is 2.75 significant 1 per cent level
At Skilled Labor level
t-ratio is 3.20 significant 1 per cent level
Other t-ratios not significant
Managerial .15
Sales Clerical .83
Semi-Unskilled too small group

The last facet of our investigation, to determine if perhaps the liberal pattern we found was due to the high social class status of the Unitarian and Universalist parents was begun by breaking the groups down into social class. Since the only index of social class we had was father's occupation we put both males and females into a single group for this portion of the study. From Table 13 two things are clear: first that Unitarians and Universalists do have a high class status, with only 14 father's out of the total group being in the semi- and un-skilled group. The second is that the two denominations are distinctly different from one another, the differences in the percentages of two of the four classes being statistically significant. Again, both denominations deviate from the average in the same direction, only the Unitarians are more so.

It is clear from Table 14 that whether the father is in the professional, managerical, clerical-sales, or skilled labor group the value pattern of the children maintains the same "liberal pattern" which we have found consistently throughout the study. It is, again, clearly more related to religious orientation than to parental occupation.

TABLE 14

VALUE SCORES OF LIBERAL RELIGIOUS YOUTH ACCORDING TO FATHER'S OCCUPATION

Value		Profess.	Manager.	Clerical -Sales	Skilled Labor
Theoretical		44.72	43.98	42.78	43.18
	σ	6.76	6.60	6.44	6.72
	σ_m	.33	.45	.56	.61
Economic		35.26	37.14	37.34	36.58
	σ	7.88	7.00	7.08	6.08
	σ_m	.39	.48	.61	.56
Aesthetic		44.90	43.86	43.90	42.14
	σ	7.44	8.04	7.84	7.04
	σ_m	.37	.55	.68	.64
Social		41.50	42.14	41.50	42.22
	σ	7.00	7.04	8.04	6.52
	σ_m	.35	.48	.69	.59
Political		39.62	39.14	39.34	39.34
	σ	6.00	5.88	6.64	6.00
	σ_m	.29	.40	.57	.55
Religious		33.86	33.98	35.94	36.34
	σ	8.20	8.72	8.24	8.72
	σ_m	.41	.59	.71	.80

Number:

Professional:	409
Managerial:	217
Sales-Clerical:	132
Skilled Labor:	118

Once more, in spite of having no direct connection with this study, it seemed worth while to see what significant differences in value might be related to social class status. These results are given in Table 15.

The significant differences are as follows:

On *theoretical* values the children of Professional men had higher scores than those of Clerical-Sales or Skilled-Labor.

On *economic* values the children of Professional men were lower in their scores than those of Managerial or Clerical-Sales.

On *aesthetic* values the children of Skilled-Labor were lower in scores than those of Professional or Managerial Men.

And finally on *religious* values although there were no significant differences between children of Professional or Managerial Men both were significantly higher than Clerical-Sales or Skilled Labor.

Interestingly there were no significant differences at all on either *social* or *political* values.

TABLE 15

SIGNIFICANT OCCUPATIONAL LEVEL DIFFERENCE: LIBERAL YOUTH

	I.	II.	III.	IV.		I.	II.	III.	IV.
	Theoretical t-ratios *Significance level*					*Economic t-ratios* *Significance level*			
I.	—	1.32	2.98 *1%*	2.23 *5%*	I.	—	3.03 *1%*	2.88 *1%*	1.94
II.		—	1.66	1.05	II.		—	.26	.75
III.			—	.48	III.			—	.91
IV.				—	IV.				—
	Aesthetic t-ratios *Significance level*					*Social t-ratios* *Significance level*			
I.	—	1.57	1.27	3.73 *1%*	I.	—	1.06	0	1.06
II.		—	.18	2.04 *5%*	II.		—	.76	.11
III.			—	1.87	III.			—	.79
IV.				—	IV.				—
	Political t-ratios *Significance level*					*Religious t-ratios* *Significance level*			
I.	—	.98	.43	.45	I.	—	.16	2.53 *2%*	2.75 *1%*
II.		—	.28	.29	II.		—	2.13 *5%*	2.38 *2%*
III.			—	0	III.			—	.37
IV.				—	IV.				—

CONCLUSIONS

1. We have seen a consistent "liberal pattern" emerge, held by all of the Unitarian and Universalist youth, and not influenced by specific denomination, sex, geographical location, year in school, or father's occupation. It would seem to be, therefore, a pattern that results from their denominational affiliation with the liberal church.

2. This so-called "liberal pattern" is one that is high on theoretical, aesthetic, and social values and low on religious values. We have advanced the theory that this does not mean that the Unitarian-Universalist youth are so much *lacking* in religious values as *different*. It is not without interest that this is essentially the pattern found in a previous study for Jewish youth.

3. Although this pattern is consistent with that of the parents, there is

no point to point relation between father-son and mother-daughter scores. This is a point which would bear further investigation.

4. So far as our study shows there is no relation between the strength of specific values and the number of years the youth has been under the particular curriculum of their denominations, known as the *New Beacon Series in Religious Education*. Again further research is needed to investigate the sources of the value systems.

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WEAK-LIGHT REINFORCEMENT AND FLASH DISTRIBUTION*

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A. INTRODUCTION

A recent study of light-onset reinforcement (3) found that rats receiving 30 or up to 90 reinforcements failed to bar-press reliably more than their controls. Significant learning was obtained, however, when only 10 flashes were given, indicating that only the first few flashes may have acted as reinforcers in that experiment. It was suggested that "light-onset is reinforcing, but only to the extent that it is novel, i.e., has seldom been presented recently." Berlyne (2, p. 146) offers a similar hypothesis. Since novelty depends upon distribution as well as number of flashes, the more widely spaced, the more effective the light should be. The present study was designed to test this supposition. Here, flash distribution depended only on *S*'s response rate, since each press turned on the light. The study consists of three experiments, in each of which response rate—and hence flash distribution—was manipulated in a different way.

B. EXPERIMENT I

In this experiment, response rate was manipulated by varying the size of the bar. For two groups of *S*s (experimental and control groups), the lever was 1 in. wide; for another pair of groups, 5 in. wide. Using the same apparatus as the present experiment, Horn (5) found much lower unconditioned rates of bar-pressing with the 1-in. than with the 5-in. wide bars. Hence more evidence for light-onset reinforcement was expected for the narrow bars.

1. *Subjects, Apparatus, and Procedure*

The *S*s were 32 pairs of male Holtzman albino rats, about 220 days old. They had been employed in another light-onset experiment (3) approximately four months earlier. The pairs were housed together with food and water always available and with the room lights on at all times. They were assigned

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randomly to the lever sizes and one member of each pair was assigned at random to a control group. The apparatus consisted of two Skinner boxes, 9 in. wide by 14 in. long by 7 in. high. A sheet steel lever, either 1 in. or 5 in. wide, extended 1 in. into the cage, at a height of 5 in. The reinforcing light was a 6-w., 115-v. pilot lamp, mounted outside the apparatus and 6 in. above the bar. A resistor reduced the lamp voltage to 95 v. The boxes were shielded from sound and light by large Fiberglas-lined covers.

The experiment lasted two days: one day of lever training and one day of testing for retention of lever training. On the first day, after a pair of *S*s had spent 5 min. in the darkened Skinner boxes, the experimental *S* was given 20 reinforcements (1-sec. light presentations) for bar-pressing; then both *S*s were quickly removed. On the second day, the pair was returned to the apparatus for a 20-min. extinction period.

2. *Results*

The reinforcing effect of the light was measured by the difference in the number of presses made by an experimental *S* and its control on the second day. With the narrow bar, the difference between experimental and control groups was significant at the .001 level according to the *t* test ($t = 4.32$; d.f. $= 15$). With the wide bar, on the other hand, the difference did not reach the one-sided significance level of .30 ($t = 0.44$).

C. EXPERIMENT II

In this experiment, the *S*s' rates of bar-pressing were manipulated by leaving one group in the apparatus for 30 min. before training began, while the other group started lever training immediately. Previous studies (e.g., 5) have shown that the operant level decreases considerably during the first half hour.

1. *Subjects, Apparatus, and Procedure*

The *S*s were 19 male rats, similar to those of Experiment I but now about 240 days old. Their living quarters were always lighted. Ten were assigned randomly to the immediate training group; the other nine, to the 30-min. operant level group. The Skinner box was similar to the previous ones but had two levers, 2 in. wide and 3½ in. apart, with the 6-w. lamp above and midway between them. Pressing one (randomly selected) bar turned on the light for one second; presses on the other bar were recorded but had no other effect. Training and testing took place in a single period. After zero or thirty minutes in the apparatus, *S* was given 10 reinforcements, followed immediately by a 20-min. extinction period. For the 30-min. operant level group, the light was on during the operant level period; thus any group difference in the light's reinforcing power could not be attributed to dark adaptation or to light deprivation.

2. *Results*

During extinction, the 30-min. group showed a significant preference for the previously reinforced bar ($t = 1.97$; d.f. $= 8$; one-sided $p < .05$). The immediate training group did not show a significant difference ($t = 0.70$; d.f. $= 9$; one-sided $p = .25$).

D. EXPERIMENT III

Here, pressing rate was varied by selecting *S*s in terms of their response frequencies during a previous operant level test (5).

1. *Subjects, Apparatus, and Procedure*

The *S*s were two groups of 9 male Holtzman rats, about 225 days old. About 75 days before, their operant levels had been measured in the Skinner boxes of Experiment I. These groups contained the slowest and fastest animals respectively from the 40 *S*s tested at that time. The apparatus and procedure were the same as in Experiment II except that reinforcement began after *S* had been in the darkened box for 5 min.

2. *Results*

During the extinction period, the low operant level group pressed significantly more frequently on the previously reinforced bar than the other bar ($t = 2.95$; d.f. $= 8$; one-sided $p < .01$). For the high operant level group, the results were in the same direction but failed to reach the one-sided level of significance of .05 ($t = 1.64$; d.f. $= 8$).

E. DISCUSSION

Lever size and pre-exposure to the apparatus have been investigated previously (1, 6). Since controls for direct evocation or facilitation of bar-pressing by the light (4) were not included in these studies, their relevance to the novelty hypothesis is in doubt. Taken together, the results of the present experiments suggest that *S*'s response rate is a determiner of weak-light-onset reinforcement. Whether distribution of flashes is the crucial factor here cannot be ascertained from this study alone. It would also be necessary to show, for example, that slow responding loses its advantage under *periodic* light-onset reinforcement, where flash distribution is largely independent of response rate.

F. SUMMARY

Three experiments were performed to test the supposition that weak-light-onset reinforcement depends upon the temporal distribution of flashes, and thus, with continuous reinforcement, upon *S*'s rate of responding. In these experiments, response rate was manipulated by varying the size of the lever and the time in the box prior to conditioning, and by selecting rats having high and low unconditioned rates of bar-pressing. In each experiment, significant learning was found only for the condition of lower response rate.

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A SCALE TO STUDY LOGICAL CONSISTENCY OF IDEAS ABOUT EDUCATION*

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While there are instruments to appraise critical thinking (3, 8), and numerous tests of teacher attitude such as the MTAI (2) and the Kerlinger Scale (5), there are no available instruments to appraise the logical consistency of an individual's ideas about education. Concern with the logical dimension of education has increased recently, both in the realm of empirical studies (11) and critical studies (1). The instrument reported in this study was developed to evaluate logical consistency of ideas held about education as one aspect of an experimental teacher preparation program (4). The scale became known as the GNC scale.

A. TEST CONSTRUCTION: CRITERIA AND PROCEDURE

In constructing the scale it was necessary to make certain basic assumptions concerning human behavior and desirable habits of mind in teachers. While in some instances it may be helpful to make a distinction between cognitive and non-cognitive behavior, for the purpose of this study such a distinction was not considered to be of primary importance.

Another assumption was that logical consistency of ideas about education has positive value. This assumption may be made an hypothesis in subsequent studies and empirical evidence may be sought to establish the various relations between logical consistency and other variables. In order to establish the fact of logical consistency, one must first assume that it exists or can be brought into existence through teaching, and that its existence is desirable in teaching.

Several criteria were used in the construction of the GNC scale. First of all, the instrument must not supply, through its own construction, obvious cues to the reader by which he might learn to respond. Therefore, it seemed desirable to have a large number of varied items so that one reading of an item would not be sufficient for the person to remember it nor remember his placement of it as he faced other items.

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The reader who brings to the scale a particular framework of thought should reveal it by the way he judges the separate items. The reader who does not bring to the scale a consistent framework of thought should reveal such inconsistency with a distribution of items approximating a random placement. Thus, the reason for the use of a scoring sheet of 100 cells representing a normal curve is that inconsistency may be defined as random placement of items. The probability of finding logical consistency when items are sorted at random would be extremely small.

The scale should not be simply an intelligence test, such that an intelligent person without a framework of thought about education could do as well as an intelligent person with a framework of thought.

The items of the scale should have face validity. They should appear to be items about education which might be appealing to a thoughtful person.

A person who has a consistent framework of thought should be able to reject and to select items in terms of the point of view he holds. Hence a test of logical consistency of ideas about education should include items one may defensibly reject as well as items one may defensibly accept. Consequently, the test is composed of two sets of items, logically consistent within a set but inconsistent between sets. Although some items are mutually exclusive, not all items of each set are; in each set the items are consistent with each other.

The sets of items should not require formal consistency at so abstract a level as to be unrelated to activities of teachers. Likewise, the items should not require formal knowledge of logic (i.e., courses in logic) in order to be manipulated as required by the scale.

The statements for the GNC scale were drawn from the several cosmologies of Western culture. In some cases, the statements were quoted directly from well-known philosophers such as Plato, Aristotle, and Dewey. In other cases, statements from well-known philosophers were paraphrased. In still other cases, the authors coined statements consistent with, or deduced from, specific theories and principles of well-known philosophical systems. In this way, over 250 statements were compiled.[1] The authors analyzed the statements for their meaning, relevance, ambiguity, and emotive impact. Similarly, the statements were checked for their denotations, connotations, and for their moral imperatives. The authors sought to weed out ambiguous statements or clarify them by rewriting them. No statements were purged of emotive impact, "halo effect" connotations, or moral imperatives, except where there was ambiguity due to logical syntax. One example will illustrate this procedure.

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[1] Some of the 250 statements of the rational-empirical dichotomy were suggested by professors John S. Brubacher, Robert S. Brumbaugh, and Lawrence G. Thomas, who are not, of course, responsible for the use we made of these statements.

One statement in the scale reads: "Learning is essentially the impact of mind upon mind." To some readers this might appear to be an ambiguous statement, or even a meaningless statement. What is "mind"—tabula rase, ideas, an energy, a substance, a faculty, a spirit, or what? What is "learning"—a product of study, the activity of gaining knowledge, or what? What is meant by "impact"—a physical collision, a spiritual experience, or merely the interchange of ideas? From a given philosophical system these key terms may become meaningful, ambiguous, or meaningless. To idealistic philosophers who stress the fundamental reality of mind the statement is meaningful, and expresses a penetrating insight into the educative process. To modern analytic philosophers, the statement might appear rich in connotations and emotive appeal, but either ambiguous or possibly even misleading. In the latter case, the statement tells us something, but we do not know what; it is likely the statement would be rejected.

Since the statements such as the one just cited are out of their context or frames of reference, the student must himself supply the context or frame of reference. Again this is a way of forcing the student to make his framework of thought explicit. The context or framework of thought which he provides or reveals is indicated by the placement of the cards.

In keeping with the criteria for constructing the GNC scale, two sets of items, each consistent within the set and inconsistent between sets, were required. Accordingly, the scale, was structured in terms of two schools of philosophic thought—the rational and the empirical. Although there are numerous gradations between extreme philosophical positions, philosophy can be classified in terms of rationalism and empiricism (7).

The rationalistic view, which more nearly represents classical philosophies (those developed before the rise of modern science), tends to lay stress upon intuition, a priori knowledge or sensibilities, speculation and formalism. Empiricism, which represents modern philosophies, tends to be more analytic with stress upon perception, observation, problems of men, and experience. The intuitive and speculative tendency of rationalism puts a premium upon systems of ontology, cosmology, and metaphysics; the more empirical view of modern philosophy either rejects cosmology and metaphysics or redefines them so as to avoid answering what empiricists term "unanswerable" or "meaningless" questions. The rationalistic view has also been termed essential and perennial while the empirical view has been called experimental and functional.

The GNC scale, rather than offering four or more basic cosmologies or systems, offers instead degrees of variation within the two larger classifications of rationalism and empiricism. This approach can account for the several cosmologies and provide for them by allowing degrees of variation in the larger classifications into which they fit.

One of the first steps in developing the scale was to test the reliability of the dichotomization of rational-empirical statements made by the authors. This problem was approached in two different ways: first, by comparing the consistency of the authors over a period of two weeks; and second, by comparing the consistency of the authors' judgments with that of independent, expert judges.[2]

Initially the authors separately sorted the 250 statements into three categories: rational, empirical and not useable. From this sorting one hundred statements (fifty rational, fifty empirical) were selected for the scale by unanimous agreement. Two weeks later the authors resorted these one hundred cards. Their agreement from one time to the next was ninety-eight per cent.

When the authors' sorting was compared with those of independent experts, agreement was extremely high. The specific per cents of agreement were ninety-five (Payne), ninety-six (Knepler), and ninety-seven (Brubacher). In view of the fact that the sorting of the independent experts coincided with the authors' sorting almost as completely as the authors agreed with themselves, it was concluded that the distribution of items reflected a consistent and meaningful dichotomy.

B. Administration and Scoring of the Scale

The administrative procedure is illustrated by the following instructions given subjects.

INSTRUCTIONS

GNC scale

> **We feel strongly that you are in a favorable position to make important judgments about characteristics of teachers. We are therefore seeking your reaction as a part of a research project. Your personal identity will be protected, and your responses will in no way determine your success or failure in pursuing graduate work.**
>
> **Please put your research number (not your name) on the answer sheet in the upper right hand corner.**

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[2] The three independent judges represented diverse fields: one was an educational philosopher (Dr. John S. Brubacher), one a sociologist (Dr. Abraham Knepler), and the third a psychologist (Dr. Donald E. Payne).

The GNC scale presents a range of viewpoints toward education. There are 100 statements characterizing what an ideal teacher might *think about, be like* or *do.*

Read a statement. If you think a statement is *most* like an ideal teacher, then you should write the statement number in a cell toward the right side of the scale. If you think the statement is *least* like an ideal teacher, then you should write the statement number on the answer sheet in a cell toward the left side of the scale.

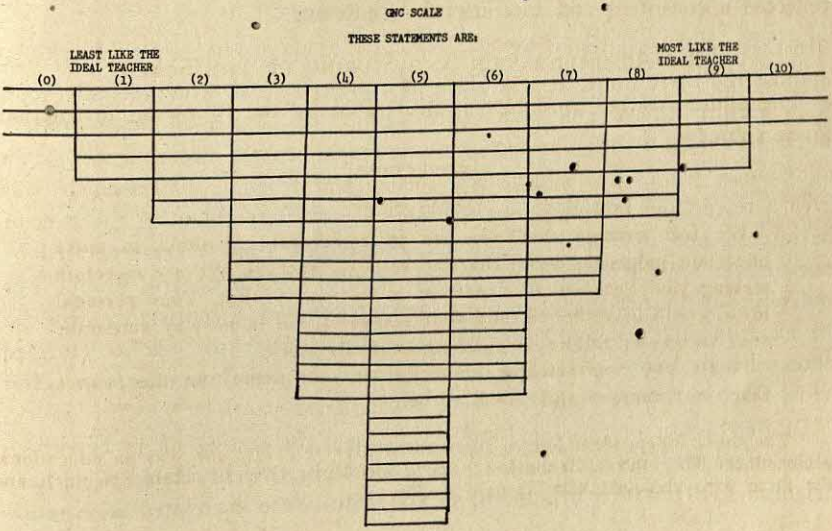
After you have read the statement, and entered the number of the statement in an empty space, then turn the statement over, put it in a pile, and do not look at it again. You are not to compare one statement with another.

Each cell should have only one number in it and all 100 cells should be filled.

As you near the end of the stack of statements, the number of spaces for recording answers will become fewer and fewer. Do not worry about this restriction because it is part of the design of the scale and is the same for everyone.

Thank you.

The procedure for scoring the GNC scale requires several steps. First the item number must be marked as either *E* (Empirical) or *R* (Rational). This may be done by placing a colored dot in the upper right hand corner of each cell, with red for *R* and blue for *E*. Next the number of *E* items in each column is multiplied by the column number (from 0 to 10). Thus, for



example, two *E* items in column number 0 would be weighted zero and two *E* items in column number 10 would be weighted 20. Each column will yield a total *E* value, and these *E* values must be added together across the 11 columns. The maximum possible raw *E* score is 330. Random placement of items gives a theoretical score of 250. The maximum *E* score then is 80, or the difference between the maximum (330) and the random score (250).

The same procedure is followed for the *R* (Rational) items. The rational scores may be identified by a minus sign (not to be confused with negative numbers). The lower the numerical score the less consistent the person; the higher the score (whether plus or minus) the more consistent the person. A score of ± 32, when compared to a theoretical random sort, is found to be statistically significant (using chi square) at the .05 level of confidence. Scores of ± 37 and ± 41 are significant at the .02 and .01 levels respectively.

A person may be judged to have logically consistent ideas about education if his score is ± 32 or more. The degree of consistency may be increased by changing the cutting score to 37 or 41. The researcher using the GNC scale will have to decide how high to place the cutting score beyond ± 32.

The reliability of the GNC scale was determined by test-retest correlation on a group of 18 teachers. The times of testing were separated by four months. The reliability coefficient was .86. The average correlation of each item with the total score is .32.

C. USES OF THE SCALE

In the experimental study of part-time college faculty, the GNC scale was administered three times. It was given as a pre-test to an experimental group of 19 faculty interns and to a control group of 10 persons appropriately matched to the interns. The test was given again to the experimental group following a seminar or educational theory and teaching practices. It was given a third time following one semester of actual teaching on the part of the interns, and to the control group. The testing times were separated by four months for the interns and by nine months for the control group. The control group did not change in group measures of logical consistency, whereas the experimental group did change significantly after the seminar toward increased logical consistency. No loss in gains in the experimental group (after actual teaching) were found to be statistically significant.

Another aspect of this same study concerned the testing of an hypothesis to the effect that increased consistency would be negatively related to authoritarianism. To test this hypothesis, GNC scores were correlated with scores

GNC SCALE ITEMS

Random Order		Card Number
*1.	In the teaching of some subjects, the attitude of the teacher should be one of persuasion, not inquiry, in order that he may fulfill his function—that of an instrument of transmission of established truth.	73
*2.	Teaching is best conceived as a sequence of assign-study-recite procedures in which students must spend more time in preparation for class than in recitation.	20
*3.	A knowledge of history is worthwhile in itself because it embraces the accumulated wisdom of our ancestors.	40
4.	The teacher does not teach; he creates a learning situation.	46
5.	Students should not be taught to seek adjustment to things as they are, but should be given tools for the improvement of conditions in terms of what is possible.	50
*6.	The aim of instruction is mastery of objective knowledge.	30
*7.	Learning is essentially the impact of mind upon mind.	52
*8.	Knowledge for its own sake is of greater value than knowledge for some vocational or practical purpose.	67
9.	If standards and values are to function effectively in the learner's life, then they must be created by the learner himself out of his own experiences, including critical evaluations of the experiences of others.	53
10.	The function of the college teacher is not merely to teach the student how to think—as if this were an abstract skill, apart from subject matters thought about—but to get him thinking *in* and *about* the major fields of human interest.	42
*11.	A teacher of physics may teach that physical laws are unchanging and certain in their essential nature, although some slight error of measurement may make their particular expression in the classroom crude and imperfect.	19
*12.	The values of subject matter range in a hierarchy such that the study of arts and sciences is always better than a study of accounting or bookkeeping.	62
13.	A teacher of physics may teach that physical laws are uncertain and subject to change since the best statements about the physical world are based on relativity and probability.	58
14.	The learning goals of the class should be developed cooperatively by the teacher and the students.	31
*15.	A sound education can best be obtained by struggling with the great minds of Western culture.	44
*16.	Self-discipline is best achieved by, first, knowing what objective norms one ought to conform to (i.e., which are universally valid), and then conforming to them willingly.	48
*17.	Since it is not possible to interest all students all the time in what they need to know, the teacher should on some occasions use coercion to achieve student development.	61
18.	Every subject has its vocational aspects which are important.	23
*19.	Education is liberal when it forms the student's mind after the pattern of objective reality and scientifically determined natural law.	25
20.	Among students, respect for fact is not enough; there must be respect for authority—not the authority of a person, an institution, dogma, or doctrine—but the authority of intelligent inquiry.	41

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* Items marked by an asterisk are compatible with rationalistic view while the unmarked items are compatible with an empiricistic view.

GNC SCALE ITEMS (*continued*)

Random Order		Card Number
*21.	The teacher should spend most of his time with those students who have the greatest intellectual potential.	
22.	What one knows about anything is what he can do with it or about it.	63
*23.	It makes little difference what subjects the student studies so long as he studies with great minds.	71
*24.	Teaching is a process of unfolding or drawing out what is already in the student.	21
25.	To the extent that a student is capable of thinking, he puts some portion of an apparently stable world in peril; and no one can wholly predict what will emerge in its place.	36
*26.	The good teacher is one who can sense the presence of the Eternal in the temporal; who can think the thoughts of God after him; who can feel that the course of nature is the art of God; who can think the universal reason in all things; and who can discern a universal will in all existence.	32
*27.	Upon the schools of America must rest, as their dominant task, the guardianship and transmission of the cultural heritage.	57
*28.	Required reading of literary works, even though it may bring an unfavorable attitude toward literature, is necessary in a sound educational program.	65
29.	Teaching is essentially a stimulation and guidance of the learner's purposes in solving consciously perceived problems and gaining anticipated satisfactions.	56
*30.	Teaching is most efficient when the teacher has planned a carefully developed lesson, minute in detail and logical in organization.	69
*31.	Teaching consists of (a) providing and explaining a pattern of behavior for the student to imitate (instruction), (b) arousing the student to activity (motivation), (c) demanding achievement in that pattern through appropriate praise and censure (discipline).	45
32.	Learning and teaching are co-operative ventures of creating knowledge and truth.	49
33.	Teachers need not agree on any overall philosophy of education if they are able to agree upon a method by which disagreements may be settled.	26
*34.	There are certain bodies of subject matter which have inherent educational value and which should always be included in every curriculum.	34
35.	The student's privilege of making choices should be limited only by his capacity to accept personal and social responsibility for the outcomes of choices made.	51
*36.	The best preparation for the future is a thorough knowledge of the past.	74
37.	The way in which a learner reaches any conclusion (a fact, skill, or attitude) is usually of more significance to his development than the conclusion itself.	55
38.	Beliefs and attitudes should not be accepted by students and teachers merely because they have been held valuable traditionally.	38
39.	The teacher accepts the fact that he might incur the hatred of people, including his students, who have reason to fear the search for truth.	59

GNC SCALE ITEMS (*continued*)

Random Order		Card Number
40.	Students should he helped to understand that no conclusions, doctrines, and viewpoints originate from a source so superior as to preclude criticism, modification, or rejection.	28
41.	There is no definite best educational procedure for teaching any subject, outside of a specific situation.	33
42.	Self-discipline and the value of effort are learned by overcoming natural or intrinsic obstacles to desired goals.	43
43.	All students should be helped to understand that there is no authority that is not susceptible to examination, criticism, and evaluation.	47
*44.	Students should frequently be required to perform difficult tasks in school as preparation for conditions they may meet later in life.	60
45.	Whatever motivates the learner's efforts defines the actual learning goal that is being sought by the learner.	37
*46.	The more abstract the knowledge, the greater its validity or certainty.	35
*47.	A teacher may teach that the individual person is in essence following the unchanging laws of human nature, even though in some cases students appear to violate these laws.	66
*48.	Education is a form of indoctrination: indoctrination is defined as positive teaching.	78
*49.	Students should learn that true knowledge of reality comes through revelation, and that reason is more important than sense perception in the quest for knowledge.	39
50.	Subject matter lacks potency, meaning, and value for the learner unless related to his social context and range of interests.	27
*51.	Objective scientific procedures and results should be the final arbiter in determining educational policies.	77
*52.	In the interest of social stability, the youth of this generation must be brought into conformity with the enduring beliefs and institutions of our national heritage.	22
53.	The function of the teacher is ultimately to make himself dispensible in the process of education.	80
*54.	In this period of rapid change, it is highly important that education be charged with the task of preserving intact the long established and enduring educational aims and social objectives.	18
55.	Educators can never be certain which educational road leads to over-all progress.	68
*56.	The teacher is an impersonal channel of communication, transmitting knowledge from those who know to those who do not know.	70
57.	Students should learn that moral values are held subject to revision in the light of further experience.	64
58.	If democracy in education means shared thinking, then the person who fails to think, rather than the one who differs from the majority, is the least democratic in his basic attitudes.	72
59.	It is more important that students first think and attack problems than that they first specific bodies of required content.	88
60.	All beliefs and attitudes should be open for examination as to their meaning and usefulness for present day and future living.	76
*61.	Students should not be given freedom to control themselves and make their own decisions before they have the knowledge and maturity to do so wisely.	92=
62.	Conformity and uniformity among students are of somewhat less value than creativity and inventiveness.	75

GNC SCALE ITEMS (*continued*)

Random Order		Card Number
*63.	Education should be directed primarily toward preparation.	79
*64.	The teacher may use fear of supernatural consequences of immoral acts as an aid in the development of healthy moral living among students.	85
65.	Educational aims as well as content should be continually refashioned for a particular society in a particular place and at a particular time.	89
66.	Since one of the principal problems of teaching is keeping the experiences of the students moving along subject matter lines with which the teacher already has familarity, the teacher needs to know both the subject matter and the peculiar needs and capacities of the students.	81
*67.	In order for the student to make a moral choice in a given situation he needs to know what is truly right and what is truly wrong in relation to that specific situation before he chooses.	84
*68.	Good teaching proceeds on the assumptions that reason is a measure of all things, that individuality must be subordinated to universality, and that percepts are less significant than concepts.	90
*69.	Schools should indoctrinate the students in the ideals of democracy.	87
70.	On controversial questions which arise in the classroom, the teacher should permit free presentation and discussion bv students of relevant viewpoints.	83
*71.	Students profit most from teachers who know their subject, express information objectively, and who keep themselves and their personal feelings out of the picture.	98
72.	Moral values, like all other values, are best learned when the learner tries out his value judgments in practice and undergoes the consequences.	82
*73.	The content of the curriculum should be limited by (a) what it is safe for the learner to experience in view of his nature, weakened as it is by original sin, and (b) what will aid him in the achievement of his supernatural destiny.	86
*74.	The more concrete the knowledge, the more valid and certain it is.	91
*75.	Learning is the unfolding of the self to self-consciousness.	94
*76.	Within the classroom, the teacher should have the sole right to decide what controversial issues may be discussed by the students.	97
77.	In all important respects, the subject matter taught by the teacher should use the students' experiences and interests as a starting point.	96
78.	The subject matter of any course should be selected by the teacher and students.	99
79.	The basic purpose of teaching is a vigorous inquiry into past and present experience for the purpose of intelligently directing the course of future experience.	95
80.	Liberal education means liberating intelligence for capable self-direction in using the world's knowledge, more or less regardless of how certain that knowledge is.	93
81.	Intellectual discipline includes reflection over what has been done, extraction of the net meanings, and projection of ideas as ways of dealing with further experiences.	100
82.	A person improves his thinking by connecting whatever he does with the consequence of doing it.	17

GNC SCALE ITEMS (*continued*)

Random Order		Card Number
*83.	It is the function of the teacher to analyze, to systematize, and to present the subject of study in such a manner that the unfolding order of the subject will exactly correspond to the unfolding order of the mind of the student.	16
*84.	There are certain areas in education such as the revealed truths of religion, which are not tested or validated by experience and therefore are not to be considered from an attitude of experimental criticism.	10
*85.	Minimum standards of achievement, in the form of requirements to be met equally by all students, must be demanded at every level of education.	13
*86.	Teaching implies knowledge, knowledge is truth. The truth is everywhere the same. Hence, education is everywhere the same.	12
87.	A student is educated to the extent that he perceives wider choices among alternatives, increases his accuracy in predicting the consequences of his behavior, and knows better what he really wants.	14
88.	Students should be taught that critically tested human experience is the best authority available.	15
89.	The learner's purposes determine (a) what is relevant subject matter, (b) the order in which it is learned, and (c) its significance for future occasions.	11
90.	If you cannot use the subject you are studying, it has little value.	6
91.	The teacher utilizing his background of information, criticizes society and projects ideals.	1
92.	The teacher should encourage and assist students in their judging of the materials, values, and results of the instruction.	4
93.	Intellectual discipline is not achieved through merely acquiring information, but comes from actively inquiring into problems seen as significant.	8
*94.	If growth is to take place, the teacher may be obliged to coerce the indolent student, even though coercion may involve tedious memory work.	2
*95.	There are some aims in education that are inherently right and good and should be followed under all circumstances.	9
96.	Orderly behavior in life is best achieved by the student's realizing, evaluating, and accepting responsibility for the consequences of his acts.	7
*97.	Good teaching will awaken the student to his selfhood and to his unity with a greater self or world mind.	5
98.	Indoctrination stops inquiry. Without continuous inquiry, the mind is closed.	3
*99.	Learning is a process of mastering objective knowledge and developing skills by drill, trial and error, memorization, and logical deduction.	54
100.	When a student is judged to be doing failing work with material within his range of intellectual competence, such a judgment means also that the teacher has failed.	

on a personality centered test of authoritarianism known as the WSF scale (9). The hypothesis was supported by the correlation: $r = -.65$, $P = .01$.

In another study involving 46 public school superintendents, GNC scores were found to correlate with WSF scores: $r = -.43$, $P = .01$ (6).

The items of the GNC scale have been used by Drewry and his associates at the University of Tennessee in studying various aspects of graduate programs in educational administration in the United States.[3] Drewry constructed a ranking type of instrument from the items of the GNC scale so that it might be more easily administered to large groups. Drewry's instrument, which is known at the GNC Educational Views Inventory, is not a measure of logical consistency but only which of two points of view one holds. The Views Inventory was also used by Weaver to study the philosophical orientation of graduate students in educational administration (10).

A correlation between class grades and GNC of .42, $P = .05$ was found in a sample of 26 graduate students in a Guidance class at the University of Chicago. Further studies at the University of Chicago on prospective high school and elementary teachers are currently underway.

D. SUMMARY

A scale which seems useful in the study of logical consistency of ideas about education has been presented. Assumptions and criteria for test construction have been made explicit. The methods of administration and scoring have been discussed. The items of the scale have been listed in the order in which they should be read. Studies of the reliability of the scale have been referred to and some uses of the scale in experimental research have been noted. Further experimentation is now underway at the University of Georgia and the University of Chicago.

The GNC scale needs further development and validation. At present it seems most effective in discriminating between those with little or no background in advanced formal study (less than a master's degree in education) of education and those who have undertaken such study (master's and Ph.D's). Presumably, GNC scores might be related to the amount of advanced study one has in educational philosophy and psychology or in the more theoretical aspects of education. Finally, few consistent rationalists have been found. Whether this is a natural phenomenon reflecting a shift in common sense or a defect in the instrument has not yet been determined.

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[3] This study is now nearing completion, but as yet there are no published reports of those portions of the study in which the Views Inventory was used.

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AMOUNT OF MATERIAL AND TIME OF PREPARATION FOR SOLVING PROBLEMS*[1]

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A. INTRODUCTION

One prepares for many problems by examining, synthesizing, encoding or somehow processing the material presented, before undertaking the actual production or selection of solutions, and the description of this preparatory activity is an essential but frequently neglected part of any comprehensive description of problem solving. Previous research, on concept problems, succeeded in timing preparation, separate from solution, and traced the influence of certain manipulable dimensions of the problem and the immediately preceding problems on preparation (4). In these problems and in many serial perceptual tasks, like reading, when *S* has difficulty in finding a solution, he turns back, if possible, to a review or reformulation of the preparatory material, then looks ahead again for a solution. A method was devised for identifying these regressive activities, called switchbacks, and predictions about their occurrence were confirmed. In these experiments the amount of material presented appeared to be important, but the amount was not specifically manipulated, hence the present experiments are directed mainly toward this variable with the hope that variation in the amount of material will further clarify the separation of the preparation process from the solution process.

The stimulus materials used in psychophysical research are usually described in quantitative terms, as are the word lists used in studies of verbal learning, but, as Duncan (2) and other reviewers have pointed out, quantification of the variables that influence the difficulty of problems is not common. Since the present investigation is concerned primarily with preparation, problems are needed in which the variable with the most effect on difficulty of preparation can be systematically varied over a wide range. Assuming that preparation for many problems consists of some kind of processing of the material presented, the type of problem most suitable for present purposes

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[1] Supported by a grant from the National Science Foundation, except for Experiment V, which is a portion of a Master's thesis by Lincoln.

would ask *S* to find a solution that meets specifications stated in terms of discrete items, such as adjectives or digits. This type is common in real life and is convenient in the laboratory because problems can be constructed with varying numbers of specifications in the preparatory material and with varying numbers of alternative solutions to select from and also because exposure of the specifications can be separated from exposure of the alternative solutions. The example below, to be typed on a 5 × 8 card and presented in a serial-exposure apparatus, illustrates a problem with four specifications and five alternative solutions.

flat
readable
descriptive
gummed

1. map
2. book
3. label
4. paper
5. globe

S is instructed to study the material on the left or preparatory side and to be prepared to find an object that meets these specifications. When he is ready, he turns a switch that shifts the light to the right side, exposing the alternative solutions, from which he selects one and presses an appropriately numbered button. When switchback is permitted, *S* is instructed that he can turn the light back to the left side of the card when he wants another look at the specifications, then attempt solution again; one such switchback was forced during practice trials. Time taken for switchback was automatically cumulated with time of initial preparation. A system of relays cuts out one light when the other is turned on in order to prevent either illumination of both sides at once or a dark interval between exposures. Thus for each problem a record was obtained of time taken for preparation, time taken for solution, the solution chosen, and, for certain groups, the number of switchbacks.

As the amount of information or, in this case, the number of specifications is increased, the overall time required for each problem will increase, but the advantage claimed for the serial-exposure method is that time taken for preparation and time taken for selection of a solution can be recorded separately. Obviously the time spent on preparation will increase with an increase in the number of items presented. If time spent on selection of solutions does not increase similarly, one may infer that preparation is complete when solution commences or, in other words, that preparation and selection of solutions are separate activities.

Preparatory activities will differ, of course, for different problems but if, as in the present task, the preparatory material consists of discrete items which must be grasped and retained for use in the next operation, the limits of immediate memory must be considered. Miller (5) has shown the significance of the "magical number seven, plus or minus two," for similar tasks, using the concepts of information theory, and the limits placed on problem solving by the span of immediate memory have been pointed out by Johnson (3). The amount of information to be remembered is also a part of the notion of cognitive strain, as used by Bruner, Goodnow, and Austin (1) to compare various strategies for attaining concepts. The range from three to 11 items was chosen for the present experiments in order to collect data below and above the span of immediate memory.

It is possible that serial exposure of the two parts of the problem disrupts the natural continuity of problem-solving activities and reduces efficiency. Hence, as a control on the method of exposure, both parts of the problems were exposed at once to certain groups.

B. EXPERIMENTS I - IV. VERBAL PROBLEMS

Experiment I

Problems like the above, of three to 11 specifications, were constructed such that each specification added some restriction to the solution. Each of the five solutions displayed met some of the specifications but only one met all of them. After considerable editing and preliminary testing four problems of each length were accepted, 36 in all, which the average college student could do in about 40 minutes, with five introductory problems. These were given to 10 *S*s in the standard condition and 10 with switchback permitted. The order of the words on both sides of the cards was reversed for half the *S*s, and the cards were shuffled between *S*s. The *S*s were not informed of success or failure, but occasional spontaneous expressions indicated that some failures were obvious.

Experiment II

Since Experiment I used only four problems of each length, four more of each length were constructed according to the same rules, and the experiment was repeated with 20 more *S*s, 10 in the standard condition and 10 with switchback permitted.

Experiment III

This type of problem permits variation of the number of alternative solutions displayed as well as the amount of preparatory information. The problems used in Experiment II were modified by the addition of five more alternative solutions, making 10 in all. The order of the solutions on the card was again randomized, and these were presented to 20 *S*s in the standard condition.

Experiment IV

To compare serial exposure with the conventional complete exposure of the problem, the problems of Experiment III were presented to 20 *S*s with both sides of the serial-exposure box illuminated.

C. Results. Verbal Problems

Since the differences in the results of Experiments I and II were small and inconsistent, the two have been combined. Figure 1 shows the two time curves and the relative frequency of errors obtained under the standard condition. Since there were four problems of each length and 20 *S*s, each

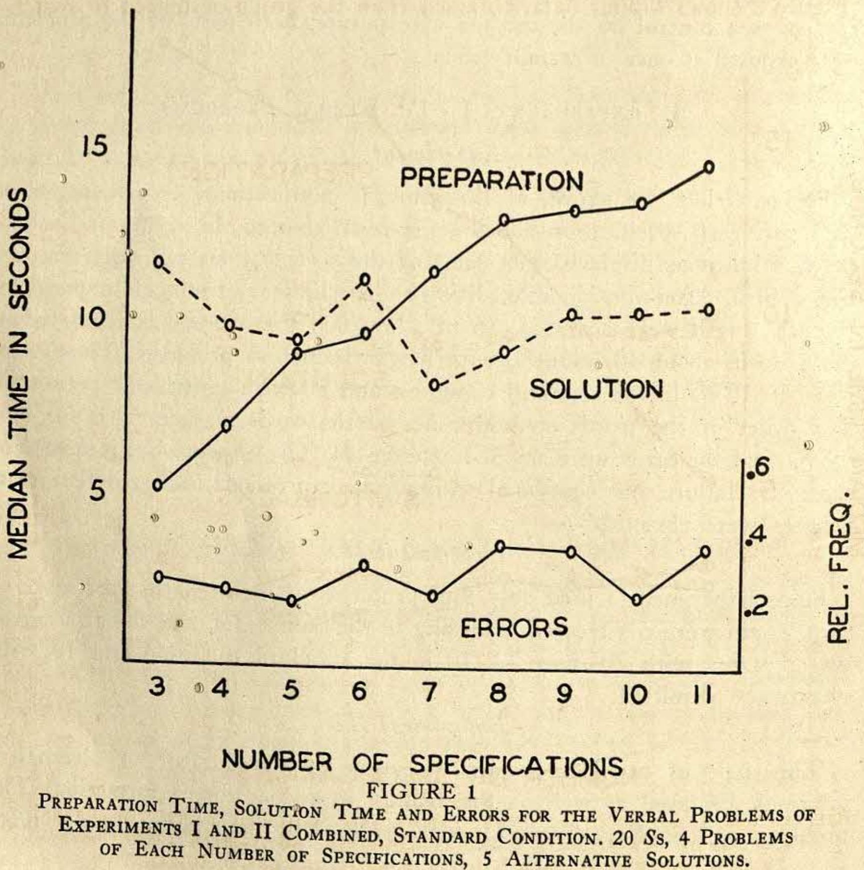

FIGURE 1

Preparation Time, Solution Time and Errors for the Verbal Problems of Experiments I and II Combined, Standard Condition. 20 *S*s, 4 Problems of Each Number of Specifications, 5 Alternative Solutions.

point on the curves represents 80 problems. As the number of specifications is increased from three to 11, median time for preparation increases from about five seconds to about 15 seconds, but there is no corresponding increase in solution time.

To check on the significance of the difference between the slopes of the two curves median times were computed for each *S* for the four problems at each end of the baseline. For problems of three specifications median solution time exceeded median preparation time for each of the 20 *S*s. For problems of 11 specifications median preparation time exceeded median solution time for 16 of the 20 *S*s, a difference which is significant at the .006 level by a sign test. Since these differences are in opposite directions, the slopes of the two curves can be considered significantly different.

Figure 2 shows similar data, obtained from the group permitted to switch

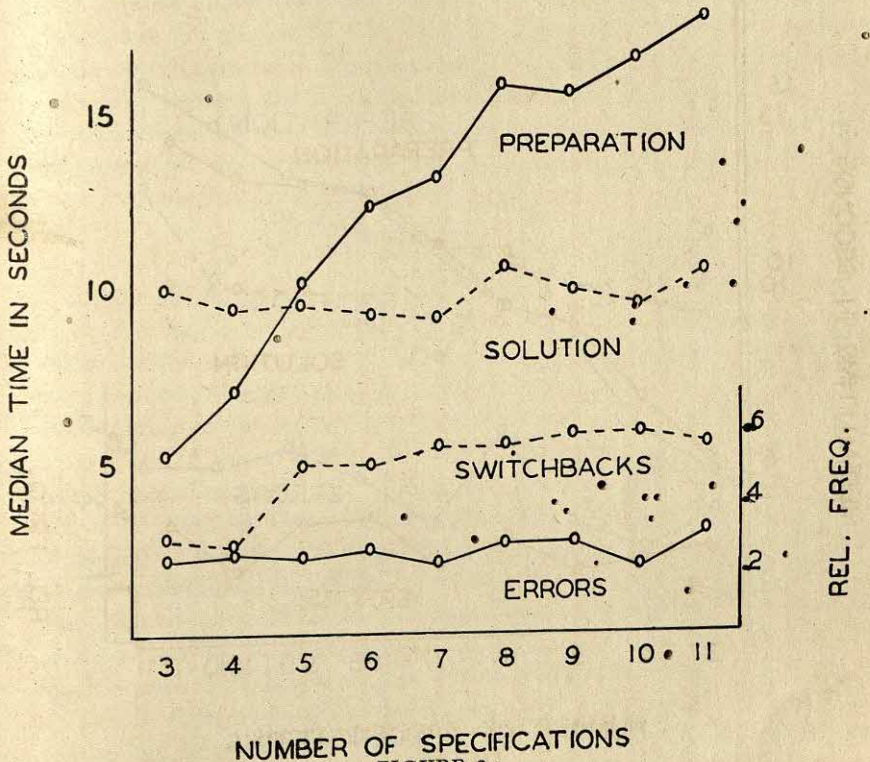

FIGURE 2

Preparation Time, Solution Time, Errors and Switchbacks for the Verbal Problems of Experiments I and II Combined, Switchback Condition. 20 *S*s, 4 Problems of Each Number of Specifications, 5 Alternative Solutions.

back, and in addition the relative frequency of switchbacks. For problems of three specifications median solution time exceeded median preparation time for 18 of the 20 *S*s, significant beyond the .001 level. For problems of 11 specifications median preparation time exceeded median solution time for 19 of the 20 *S*s. Hence the slopes of the two curves are significantly different.

The chief difference between Figure 1 and Figure 2 is that the preparation time curve of the switchback condition diverges from that for the standard condition at five specifications and is higher at all points above five. This divergence, though not statistically significant, is consonant with the doubling of the number of switchbacks between four and five specifications.

The results of Experiment III are shown in Figure 3. Display of 10 alternative solutions appears to increase solution time and errors slightly, in

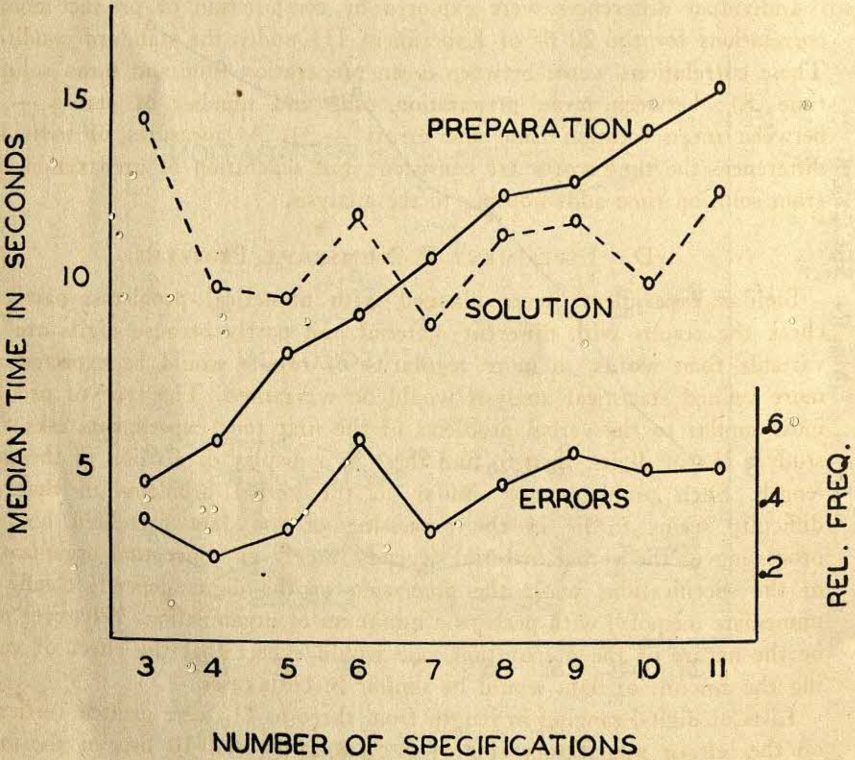

FIGURE 3

PREPARATION TIME, SOLUTION TIME AND ERRORS FOR THE VERBAL PROBLEMS OF EXPERIMENT III, STANDARD CONDITION. 20 *S*s, 4 PROBLEMS OF EACH NUMBER OF SPECIFICATIONS, 10 ALTERNATIVE SOLUTIONS.

contrast to comparable data of Experiment III with only five alternative solutions, but the general picture is the same. For problems of three specifications median solution time exceeded median preparation time for each of the 20 *S*s. For problems of 11 specifications median preparation time exceeded median solution time for 13 of the 20 *S*s. Though the slopes of the two curves are probably different, this simple test is not completely convincing.

The results obtained from Experiment IV, with complete exposure, consist only of total time and errors. In relation to comparable data from Experiment III it appears that with complete exposure *S*s take more time and make fewer errors. Since the differences are in opposite directions and neither is significant, it is clear that the serial-exposure method does not limit the efficiency of problem solving.

Individual differences were explored by computation of product-moment correlations for the 20 *S*s of Experiment III under the standard condition. These correlations were: between mean preparation time and mean solution time .81; between mean preparation time and number of errors —.19; between mean solution time and errors —.31. As measures of individual differences the time scores are consistent, but separation of preparation time from solution time adds nothing to the analysis.

D. Experiment V. Numerical Problems

Similar experiments were planned with numerical problems, partly to check the results with different material and partly because digits are less variable than words, so more regularity of results would be expected and more refined statistical analysis would be warranted. The type of problem most similar to the verbal problems of the first four experiments asks *S* to study a list of digits, then to find these in a display of 10 lists of the same length. Such problems are similar to the verbal problems in that the difficulty seems to lie in the processing of the data presented but the processing of the verbal material depends largely on conceptual organization of the specifications while the processing of the digits depends chiefly on immediate memory, with perhaps a minimum of organization. Whatever may be the nature of the preparation, one would expect that the effect of varying the amount of data would be similar in both cases.

Lists of digits, ranging in length from three to 11, were printed vertically on the left or preparatory side of 5 × 8 cards, and 10 lists of the same length were printed vertically on the right or solution side. The 10 response buttons were labelled A to J to correspond with these 10 lists, and one of the lists consisted of the same digits as the preparatory list but in different order. An example of a 4-digit problem, for which G is the correct solution, is printed below.

	A	B	C	D	E	F	G	H	I	J
3	4	7	8	2	8	5	1	3	8	1
4	2	6	5	4	3	3	3	4	0	2
1	8	4	4	1	5	1	4	1	3	4
8	1	3	3	3	1	8	8	9	9	8

These lists were prepared with the aid of a table of random numbers, hence the longer lists contained repeated digits. Five problems of each list length were prepared, making 45 problems in all, which most *S*s could do in about 50 minutes. The cards were presented in fixed order to half the *S*s and in reverse order to the other half. There were three conditions as before, Standard, Switchback, and Complete Exposure, 21 *S*s in each condition.

E. RESULTS. NUMERICAL PROBLEMS

After unsatisfactory results with reciprocals a logarithmic transformation was applied to the time data. This transformation yielded frequency distributions that were approximately normal and standard deviations roughly proportional to means. Hence the analysis of the time data was carried out with log time. Figure 4 shows the results under the standard condition and Figure 5 shows the same for the switchback condition.

Log preparation time increases regularly, almost linearly, in both graphs, and the increase is large, going from about three seconds to about 40 seconds. Solution time increases regularly also because the nature of the task required that the number of digits in each alternative list on the solution side increase along with the lists on the preparation side. Nevertheless, the solution time curve does not rise as rapidly as the preparation time curve. In both conditions the slopes are different in the sense that for problems of three digits mean solution time exceeded mean preparation time for each of the 21 *S*s, but for problems of 11 digits the curves practically coincide.

When the results from the standard condition and the switchback condition are compared, some interesting differences emerge. The two preparation time curves look similar and in fact there is no over-all difference, according to the analysis of variance summarized in Table 1. The interaction between conditions and list lengths is significant, however, and Figure 6 shows that the *S*s allowed to switch back took less time to prepare for short lists and more time to prepare for long lists than the *S*s under the standard condition. The two curves intersect between seven and eight specifications. Presumably the *S*s in the switchback group spent relatively less time on the short lists because they knew they could switch back if necessary, and they spent relatively more time on the long lists because they did frequently switch back.

TABLE 1
ANALYSIS OF VARIANCE OF PREPARATION TIMES AND SOLUTION TIMES FOR THE STANDARD AND SWITCHBACK CONDITIONS

		Preparation		Solution	
Source	df	MS	F	MS	F
Between Conditions	1	.02		1496.04	1.75
Between *S*s in Same Group	40	1499.02		856.60	
Between List Lengths	8	77733.70	963.36**	38050.70	275.99**
Conditions × List Lengths	8	228.63	2.83**	307.26	2.29*
Pooled *S*s × List Lengths	320	80.69		137.87	
Total	377				

* $P < .05$.
** $P < .01$.

Table 1 also shows the parallel analysis of variance for the solution times under both conditions. The interaction between conditions and list lengths is significant at the .05 level, but this must be interpreted cautiously because the variances for the solution times were not completely homogeneous. The interaction is due to longer solution times for the switchback group at the longer list lengths; at the shorter list lengths the two solution time curves practically coincide.

The mean number of errors for the standard condition was 7.3 per *S*, for the switchback condition 4.9. This difference is significant beyond the .05 level by a one-tail test, showing, as expected, that the switchbacks were helpful.

The results from the complete-exposure condition consist only of errors and total time. The mean number of errors per *S* was 8.2, unexpectedly larger than in either serial-exposure condition. This mean is significantly larger than the mean of the switchback condition at the .05 level by a two-tail test. Total time for the complete-exposure group was shorter than for the other two groups, but these differences were not significant. It is clear, as with the verbal problems, that serial exposure does not reduce efficiency.

Individual differences were explored by computation of product-moment correlations for the 21 *S*s of the standard condition. These correlations were: between mean log preparation time and mean log solution time .48 (significant at .05); between mean log preparation time and number of errors —.57 (significant at .01); between mean log solution time and errors —.13. Therefore, in respect to individual differences in time taken, preparation is somewhat different from solution. Those *S*s who take time to prepare make fewer errors, but this statement cannot be made for solution time. In this case, in contrast to the verbal problems, separation of preparation time from solution time is worth while. The parallel correlations for the 21 *S*s of the switchback condition were: preparation time and solution time .64; preparation time and errors —.30 (n.s.); solution time and errors —.18. Com-

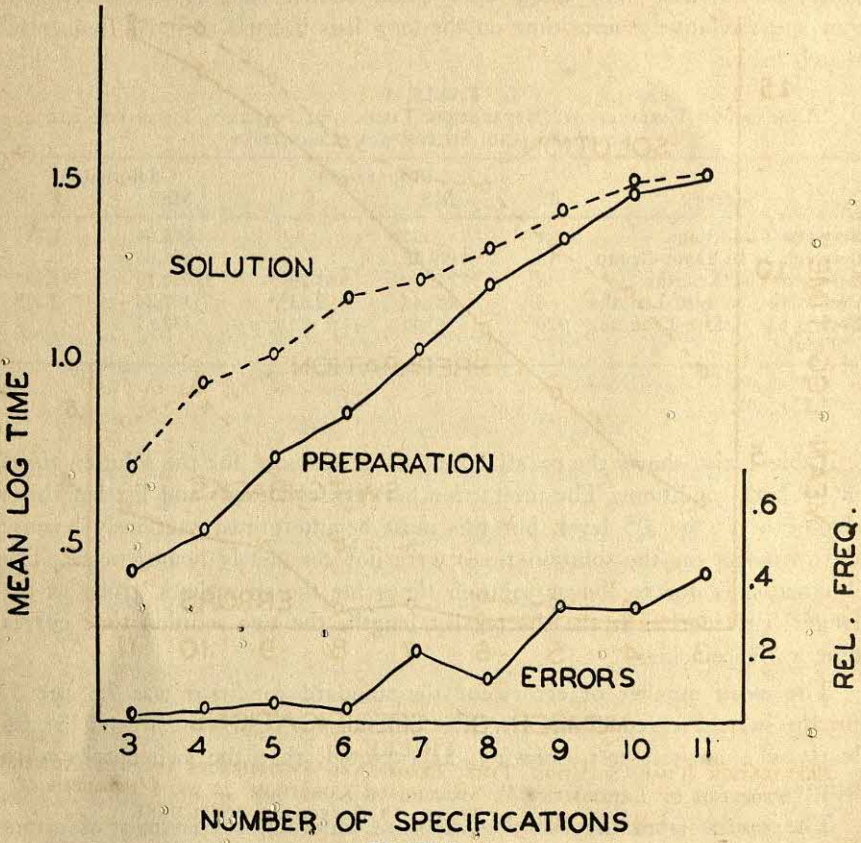

FIGURE 4
PREPARATION TIME, SOLUTION TIME AND ERRORS FOR THE NUMERICAL PROBLEMS OF EXPERIMENT V, STANDARD CONDITION. 21 *S*s, 5 PROBLEMS OF EACH NUMBER OF DIGITS, 10 ALTERNATIVE SOLUTIONS.

parisons between correlations based on such small groups cannot be taken very seriously; as far as they go, they indicate that the ability to switch back obscures the disadvantage of hasty preparation.

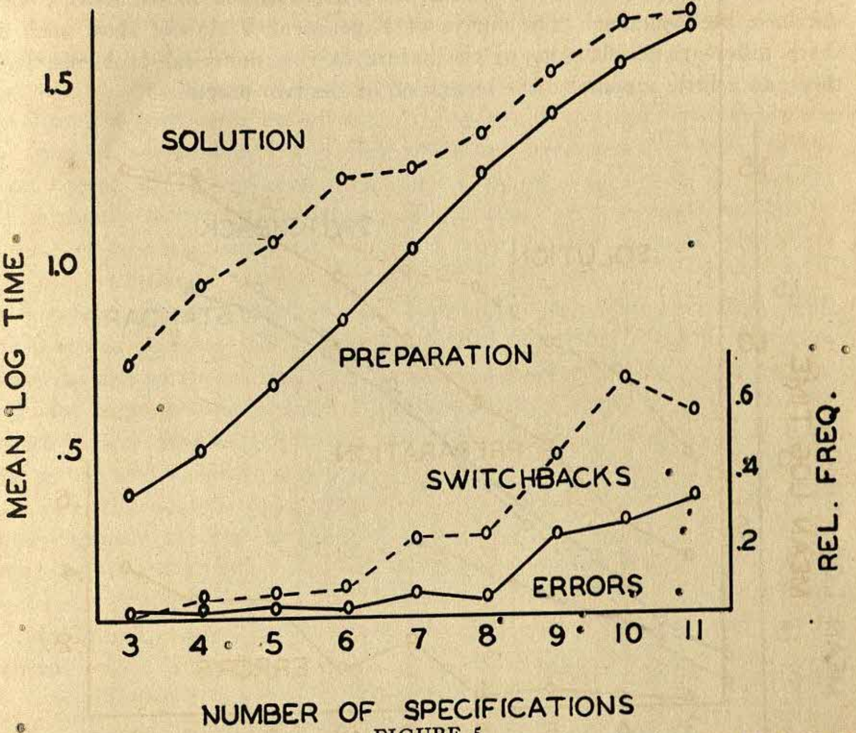

FIGURE 5

PREPARATION TIME, SOLUTION TIME, ERRORS AND SWITCHBACKS FOR THE NUMERICAL PROBLEMS OF EXPERIMENT V, SWITCHBACK CONDITION. 21 *S*s, 5 PROBLEMS OF EACH NUMBER OF DIGITS, 10 ALTERNATIVE SOLUTIONS.

F. DISCUSSION

The results of the first four experiments, with verbal problems, demonstrate that preparation is distinct from solution in the sense that the durations of these two processes are differentially influenced by the independent variable, number of specifications. If the processing of the preparatory information were not complete when *S* turns the switch to undertake solution, the solution time curves would rise with the number of specifications. An interesting consequence of these time relations is that, when the problems are short, more time is spent on solution than on preparation, and when the problems are long, more time is spent on preparation than on solution. It is possible that in some cases the processing of the preparatory material continues after, and solution begins before, *S* throws the switch, but if this overlap were any sizable proportion of the whole episode, the differentiations shown above could not have been obtained. The curves of Experiment V do not show such a sharp differentiation because of the nature of the numerical problems, but they add a little support to the separation of the two processes.

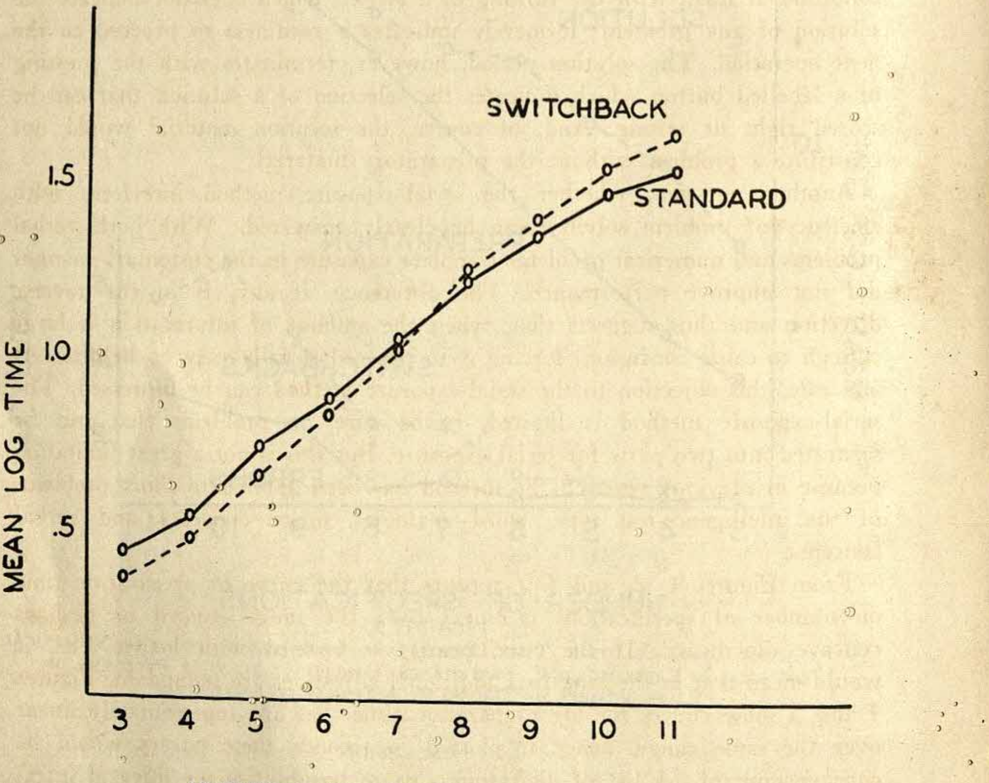

FIGURE 6
COMPARISON OF PREPARATION TIME CURVES UNDER STANDARD AND SWITCHBACK CONDITIONS. TAKEN FROM FIGURES 4 AND 5.

Analysis of individual differences supports the separation of preparation from solution for numerical problems but not for verbal problems. Individual differences in facility in manipulating the verbal material probably depend heavily on prior achievements, while in manipulating the numerical material individual differences in carefulness or willingness to take time to prepare have more weight.

Since the results at hand show that a preparation period can be identified in some problem-solving episodes and separated from the solution period per se by the serial-exposure method, one might raise the question whether preparation and solution as thus identified are two different problems. This question must be answered negatively. Preparation terminates, in the standard condition at least, with the turning of a switch which does not indicate the solution of any problem; it merely indicates a readiness to proceed to the next operation. The solution period, however, terminates with the pressing of a labelled button which indicates the selection of a solution that can be scored right or wrong. And, of course, the solution material would not constitute a problem without the preparatory material.

Another question, whether the serial-exposure method interferes with efficiency of problem solving, can be clearly answered. With both verbal problems and numerical problems complete exposure in the customary manner did not improve performance. The difference, if any, is in the reverse direction and thus suggests that, when the amount of information is large enough to cause confusion, forcing *S* to proceed serially may be helpful. At any rate, this objection to the serial-exposure method can be dismissed. The serial-exposure method is limited, to be sure, to problems that can be separated into two parts for serial exposure. But this is not a great limitation because in previous research the method has been applied to short problems of the intelligence-test type, word analogies, figure concepts, and verbal concepts.

From Figures 1, 2, and 3 it appears that the curve of preparation time on number of specifications is linear over the range studied or perhaps concave downward. If the curvilinearity is verified with longer lists, it would mean that in the long lists additional adjectives are redundant. Figures 4 and 5 show curves for log preparation time that are approximately linear over the same range, hence if plotted in seconds these curves would be concave upward. A list of digits offers more possibilities for internal interference and less opportunity for organization than words. Also the numerical task appears to be more specific than the verbal task and demands retention of all the preparatory material.

If the serial-exposure method is considered in relation to the usual method of measuring the span of immediate memory, an interesting parameter can be read from the error curves of Figures 4 and 5. In the usual memory-span test the digits are presented only once, usually orally, while in the present experiment the digits remain in view until *S* is ready to attempt to discriminate them from others. If we use 75 per cent success, or .25 errors, as a criterion, the memory span under the standard condition is about 8.5, close to the value of eight usually given for college students. Under the switchback condition the corresponding value is about 10. The latter condition, with self-paced presentation of the digits and review permitted, is analogous to the common task of looking up a number in a table or a telephone book and acting on it when ready and is probably representative of a larger population of tasks than the conventional digit-span test.

From these results a generalized description of the solution of these problems can be attempted. After the practice problems *S* responds to the presentation of the preparatory words or digits by trying to memorize them or organize them in some way that will be helpful later in the next operation. In consideration of the later use of this cognitive organization of the preparatory information, it can be called a search model (3). Naturally this preparatory organization goes quickly when the lists are short and slowly when they are long. When the lists are long, different *S*s presumably prepare in different ways but whatever the preparation consists of, *S* must have some kind of cognitive organization of the material when he turns the switch to search for a solution to match it. Apparently this preparatory organization of the material is finished when *S* turns the switch and he operates during the solution period with the search model that he has organized up to this point because, unlike preparation time, solution time is not dependent on the amount of preparatory material.

When switchback is permitted and switchback time is cumulated with initial preparation time, *S*'s operations are more flexible and his preparation time is more closely adjusted to the difficulty of the problems. He looks for a solution which fits the problem as he has organized it, and if he does not find a fitting solution, he is likely to assume that his search model is inadequate and switch back to prepare another one. Hence switchbacks are more frequent when the lists are long and, as in previous experiments, they reduce errors.

G. SUMMARY

Problems were constructed of three to 11 specifications to be solved by selection from a display of solution alternatives. Specifications and solutions were exposed separately under *S*'s control and timed separately so that the time spent organizing the specifications, called preparation time, could be recorded separately from time spent selecting a solution, called solution time. Certain groups were permitted to switch from the display of solutions back to the specifications to prepare again if necessary. Homologous numerical problems were constructed of three to 11 digits.

The results with verbal problems demonstrated that as the number of specifications is increased from three to 11, the preparation time curve and the solution time curve have different slopes. Thus preparation and selection of solutions are different processes in the sense that they are differentially influenced by the independent variable. The results with numerical problems were of the same general nature.

Analysis of individual differences showed that those *S*s who prepared slowly for numerical problems made fewer errors. Individual differences in solution time, however, did not correlate significantly with errors. This is further evidence for the separation of preparation and solution, but the parallel correlations for verbal problems did not support this separation.

The data for *S*s permitted to switch back to the preparatory material for review gave the same picture in general, but the possibility of switchback allowed them to adjust their timing more closely to the difficulty of the problems.

As a check on the serial-exposure procedure control groups were run with both sides of the serial-exposure box lighted. This did not yield any improvement in problem solving, but perhaps a slight decrement, suggesting that serial exposure may have some advantage when the material in view is confusing.

From the graphs of number of errors on number of digits it is possible to read off a parameter that is analogous in some respects to the conventional span of immediate memory. For the standard condition this takes a value of about 8.5, and for the switchback condition, when self-paced review is possible, the value is about 10.

These results permit a generalized description of the solution of these problems in terms of the organization of a search model preparatory to the search for a solution to match it.

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THE TREATMENT OF ADOLESCENTS*

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The treatment of adolescents has represented a relatively unexplored spot on the map of psychoanalytic therapy. There is general agreement that the problems of adolescence are many and important, but there has been considerable dissent on whether psychoanalysis is the method of choice for their solution. This is particularly important because so many adolescents reach treatment only as a result of conflict with the established mores and legal ways of the community and consequently are seen in the authoritative setting of the clinic, school psychiatric agency or court treatment center. In these environments, the establishment of the motivation and rapport so necessary for analytic therapy is minimized. Consequently, private work with the age group referred to has been left primarily to non-analytic personnel. In comparison with child and adult analytic practitioners, there are few specialists in this area. Even the literature of adolescence is sparse in psychological content. Most textbooks and articles deal with the social, cultural and physiological developments rather than with so-called dynamic elements. It has been only in the last two years that an informal group of therapists of adolescents has been formed.

Analytic interest in adolescence started, however, early in Freudian history. In Three Essays on Sexuality, Freud (3) first stated some of the principles which he saw as operative for the age of puberty. He characterized the period as one in which the sexual problems of infantile life and early youth had stabilized, the genital zone assumed primacy over other erotogenic areas and sexual objects other than the parents took first place in the youth's search for gratification. As ego psychology matured, more contributions were made toward the theoretical understanding of the adolescent phase of maturation. The quantitative and qualitative changes in drives were related by Anna Freud to a struggle for survival against the demands of parental pressure and social conformity. In analytic terms, the struggle between the id and the ego was revived in a new form and with new defenses and character structures. Most of the recent writing in the dynamic psychology of

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adolescence has been performed under the direct inspiration of Anna Freud and her co-workers.

Difficulties in the understanding of this age group arise from two sources. One is the paucity of information that derives from the adult's inadequate recall of adolescent experiences during the course of psychotherapy. The analysis of adults produces a bare skeleton of experiential fact rather than the rich panoply of affectively-toned data which surrounds prepubertal recollection. The emotional atmosphere of adolescence rarely comes through in work on this period with the adult in treatment. Several factors lead the therapist away from his patient's adolescence. One is a result of theoretical bias toward early life experiences as the all-important sources of analytic material. Even in his didactic training, the therapist has not been presented with any discussion of adolescence on a par with that of infancy and childhood. It is therefore easy to minimize the period. Second, since adolescence is seen as an age of normal turmoil, the recalled emotional vicissitudes of the patient are dismissed as merely typical of this stage of development. It is a commonplace of supervisory personnel to have the therapist-in-training almost literally turn the patient inside out after recall of childhood events and to pass over similar memories from the following stage. Finally, there are the unresolved feelings of the therapist about his own adolescence. Since little attention is paid by analysts to these years, it is natural that the personal analysis of the therapist should do scant justice to adolescence. Repression with its coercive force is manifest in the emotional poverty of adult recall. One can almost sense the effectiveness of repression in the attitudes and feelings so freely expressed by parents when telling about their adolescent offspring. The lack of understanding, the disgust and rage of parents at the attitudes and behavior of the 12 to 17 year old, bear silent testimony to the traumatic nature of the adult's feelings about his or her own pubertal period. Not only does this repression make for difficulty in getting at the problems of the adolescent but it exercises a feed-back into the work with adolescents since they reflect their parent's attitudes.

The second source of trouble comes from the analysis of the youngster. Here the most important roadblock is the lack of motivation and the emotional inhibition of the adolescent. Most workers report the long silences, absence of desire to evaluate self and the rebelliousness against authority figures of which the analyst becomes a part. We shall deal explicitly with these phenomena at a later part of the discussion. Suffice it here to point out how difficult these attitudes make the analytic task.

Before beginning the discussion of the treatment problems of adolescence, it would be wise to try to summarize what is generally agreed upon as psychologically characteristic of this life period. This is not the simple task that it is for the latency and infantile stages. Not only do we lack objectively obtained data but the complexity of life in adolescence makes it mandatory to include much more than the emotional, instinctual energy concepts of motivational forces. Important as an all-encompassing view is at any time of life, it is almost imperative to see the adolescent in his or her manifold aspects and interrelationships with the social, familial and scholastic world. We shall therefore start with what is known of the intellectually unique components of adolescent thinking and follow with the Rorschach and maturational data, ending with the more debatable but none the less valid analytic insights into adolescence.

For a thorough study and exploration of the unique characteristics of adolescent thinking, there is at present only one source, that of Piaget's recent work published with the frighteningly unpsychological title of *The Growth of Logical Thinking.* (6) Since I believe that Piaget's experiments are both vital for and corroborative of our analytic thinking, I shall go into brief detail about his systematic formulations.

We start with Piaget's initial bias, that current psychological tests do not give an adequate developmental picture since they do not include action or doing with learning nor do they come to grips with the central problem of maturation which to Piaget is the change in the perceptions of reality and their translation into symbolic life. The distortions and the consequent reorientation of the individual to the vicissitudes of inter- and intra-personal living are familiar problems to the analyst and constitute also Piaget's major concern. Intelligence can be seen best only through the self-experiences and adjustments of the subject not through the objective eye of the intelligence test constructor.

Piaget has found and described two types of childhood, pre-adolescent thinking. One, characteristic of the ages from birth to two years, involves sensori-motor coordination and the consequent use of schemata or generalized behavior patterns. Thinking is basically in terms of patterns of movement. Only elementary symbolism based on these activities is apparent. Stage two covers the year two to six and includes the initiation of language use. In this phase, thinking is preoperational or representational rather than operational. The outside world is represented by a symbol or generalization from a motivational model. Thus the sun moves because it is pushed by God or by Nature. Stars are said to go to bed. Learning or error elimination is done by intuitive regulation rather than by trial and error. Maladaptive behavior is repeated over and over again until some more appropriate solution comes along. This stage rapidly merges into the concretistic operations of the latency phase child. Here the individual carries out direct testing of reality through the selection of actual concrete means for dealing with the immediately present world. Symbolism is still unsystematic and represents only concrete operations.

The fourth stage, which is of immediate concern for this paper, covers the ages of 12 to 15 and involves the first uses of formal as opposed to concrete operations. Hypothetical reasoning based on a logic of relationships and controlled experimentation comes to the fore. This development differs from that of latency in that it uses internal operations of categorizing and propositional thinking. The preadolescent develops concrete operations and carries them out in systems of additive nature without being able to see the complex categories or classes of relationships. Thus no systematizing is possible in the latency child period. In contrast, the adolescent superimposes on reality a formal mechanism which enables him to organize and test the world around him. For instance, the adolescent, in our culture, differs from a child in love, in that the former complicates his affects by constructing a system or romance or by referring to social, literary or popular culture ideals. He must spin a thinking web into which to fit his feelings. He develops theories about the world, about inter-personal relationships. Thus the characteristic feature of the adolescent age is theory or model construction and the use of ideologies to surround the theories. It is clear that in so doing, the adolescent is beginning to demonstrate his assumption of aspects of the adult figures around him. Piaget sees this appearance of logical manipulation and adultoid behavior as an ever earlier developing process. One is reminded of the frequent parental complaints that their adolescents are doing what the parents did not do until they were much older.

Thus the adolescent's thinking patterns enable him and even force him to accelerate his taking on of the adult role in life. He also judges the adult on the same plane as himself because of his need to fit things into a pattern logical for him. Planning for the future is added to the development of logical thinking so that the youngster begins to scheme to change life patterns. He wants to modify adult ways of life to fit into his theoretical framework. Conflict with the adult world becomes a necessity and, whereas the child looks for resolution of conflicts to fantasy and compensation, the adolescent adds to these limited compensations, the more generalized idea of a motivation for change and specification of the nature of the change. The adolescent is the individual who begins to build systems. This involves an auto-critical, reflective ability and capacity. The systems which evolve are vital to the assimilation of values which delineate societies or classes in contrast to the inter-individual, two-person values of the child. The adolescent seeks for symbols of the values and for their place in society for himself. Thus he tries to adjust his ego to the social environment and the social environment to his ego.

In other words, what Piaget has observed is a developmental sequence. The infant at first does not know how to separate the effects of his own actions from the qualities of external objects or persons. Later he differentiates his own ego and situates his body in a spatial and causally organized field composed of permanent objects and other persons similar to himself. This is the first decenterizing process, its result, a gradual coordination of sensorimotor behavior. But when symbolic functioning and language, communication with others, expand this field to large proportions, a new type of structure is required. For a second time egocentrism appears, but on another plane. It still has characteristics of lack of differentiation between the ego and the other's points of view, between subjective and objective, but this time the lack of differentiation is representational, not sensorimotor. When the child at C.A. 7-8 reaches the stage of concrete operations, the decentering process has enabled him to structure relations between classes and numbers. At the same stage he acquires skill in interindividual relationships in a cooperative framework. But when the cognitive field is again enlarged through the emergence of formal thinking, a third form of egocentrism comes to be. This egocentrism is one of the most enduring features of adolescence. It lasts until the new decentralization makes possible the beginning of adult life. However, in adolescence, egocentrism makes for a failure to distinguish between the adolescent's desire to organize a life program and the point of view of the group which he hopes to reform, his adult world.

In more concrete terms, the adolescent's egocentrism comes out in a form of Messianic fantasy in which he plays a majestic reformer. The adolescent cannot distinguish between the ego's new and unpredicted capacities and the social world to which they are applied. Another transformation also takes place at this age. The preadolescent has little concept of social values. He experiences only interindividual affects. Ideals in childhood are always attributes of persons, in adolescents they become autonomous. Every one who works with adolescents has had some experience with many of the concepts experimentally established by Piaget. What is new is their demonstration as a stage of development of logical thinking.

We now turn to another field. What do we learn from the Rorschach projections of the adolescent child? The source of information here is the collection of data by Ames, Metraux and Walker which was recently published (1). Their analyses indicate that, by and large, adolescence is an age in which orientation to reality increases but is interlarded with emotional charges which make almost any adolescent Rorschach look abnormal from adult standards. The struggle between dependence and independence, between aggression and withdrawal, definance and conformity shows characteristics different from either the preceding or following phases of development.

However, Ames' most significant findings relate to the changes within the adolescent period and tend to destroy the concept of this age as a unitary stage. The authors find that sharp and systematic divergencies take place at certain age-levels between 10 and 16. The sharp breaks occur at 13 and 15. Thus we have three differentiated stages in adolescence, 10-12, 13-15, and 16. At 10, the child is introversive, has greater critical ability than before but is ambivalent in systematizing and in conformity-non-conformity. Oppositional and secretive tendencies appear.

At twelve there is a marked growth toward maturity. Earlier conflicts approach resolution. Realistic thinking, practical, precise, and conforming reactions are frequent. There is an interest in value systems of right and wrong. Greater restraint and a sense of self and interest in others stand out in the Rorschach picture. Some sexual concern begins to come through in the projective material.

By the age of thirteen, the youngster returns to withdrawal. Inwardization and restriction of responses show up. These individuals tend to become vulnerable to self-doubts and misgivings. Control over impulsive forces is lessened. After 14, the picture changes dramatically. There is exuberance, an appetite for experience, concern about the development of the ego and more practical, less magical thinking. The pendulum swings back again at C.A. 15 to a new period of withdrawal but this time with a thoughtful, reflectful manner rather than with the secretive attitude of previous introversive swings. The picture changes again at 16 to a more nearly adult profile. In summary, Ames states "The Rorschach between 10 and 16 does not simply become more and more like the adult response although the over-all trend is in that direction. Superimposed on this over-all trend is a somewhat rhythmic pattern, in which some ages emphasize extraversion of behavior, some introversion; some ages appear full and expansive, others relatively restricted and flattened in responsiveness." These conclusions are worth noting from the treatment standpoint since they point to two dangers, one of using adult norms in the interpretation of adolescent test responses and the second of thinking of the age period as an undifferentiated and internally consistent phase of development.

The analysts too, have tried to describe the over-all characteristics of the "normal" puberty child. We may summarize their findings as follows. In normal adolescents there is an interruption of peaceful growth. Continued equilibrium would be abnormal in itself. The reason for this is the impact of biological changes which bring about increases in the quantity and changes in the quality of libido. The directions that the disturbances will take vary considerably, depending on the formation of the ego and superego. They may be neurotic, delinquent, psychotic, antisocial. An additional element is that the bonds of cathexes to love objects in the parental figures become a challenge and a source of anxiety because of the heightened sexual awareness and libido of the youth. The resulting defensive maneuvers and character formation may then take the form of coldness, withdrawal, and rebelliousness toward the parents. Another defensive or sublimative adjustment is the formation of friendships and binding interpersonal relationships outside of the family. These represent a healthy attempt to gain a sense of adult self as distinct from the child-self. Narcism becomes an almost inevitable component of this trend since the search for identity involves an awareness of self which merges with the libidinal, sexual drive to enhance self-love as well as self-respect. Like all narcistic patients, the adolescent relates to people in a demanding way so that distrust of people is balanced by forcing the attention of the other person to the adolescent. In a sense, the adolescent must regress to an undifferentiated phase of ego development, a partial loss of identity, in order to gain the goal of a fully differentiated and unique personality. One might describe the period in Anna Freud's (2) words: "It is normal for an adolescent to behave for a considerable length of time in an inconsistent and unpredictable manner; to fight his impulses and to accept them; to love his parents and to hate them; to revolt against them and to be dependent upon them; to be deeply ashamed to acknowledge his mother before others and, unexpectedly, to desire heart to heart talks with her; to thrive on imitation of and identification with others while searching unceasingly for his own identity; to be more idealistic, artistic, generous and unselfish than he will ever be again, but also the opposite: self-centered, egoistic, calculating. Such fluctuations between extreme opposites would be deemed highly abnormal at any other time of life. At this time they may signify no more than that an adult structure of personality takes a long time to emerge, that the ego of the individual in question does not cease to experiment and is in no hurry to close down on possibilities."

Inherent in the above is a situation which Gardner (4) has boiled down into a series of tasks facing the adolescent ego. In the first place he must alter, adapt, and conceptualize his unconscious model of his parents. The preceding dependence on parents has carried with it a belief in their omnipotence and omniscience. This faith has been modified by experience and the interference of other figures such as teachers and parents of friends. The struggle with the incorporation of a new parental image leads first to the elaboration of ties to other people, crushes, not wholly sexual, and imitative behavior of popular ideals, for example, the bobby-soxers' costumes, hair-do's and patterning of behavior on adolescent stimulators. The vulnerability of the youngsters to false leaders and misleaders is great and is a frequent cause for the recommendation of therapy.

The second task is that of the development of an adequate set of values, not superimposed from above but developed out of the adolescent's need for inner controls. These standards must be achievable or else will result in frustration, conflict and reinforcement of rebelliousness.

Third in order is the job of adequate sexual identification both in the interpersonal and outer world of school, athletics and work. Finally, the adolescent must make choices in the area of education and vocation. Freud once said that adult adjustment and maturity can be in large part determined by the ability to love and to work. This calls for a great effort and understanding of the adolescent struggle to find that part of his identity which is exhibited before his peers as members of organized society.

Stated in another way, one may look at the problem of adolescence as the overtaxing of the ego as a result of the impact of the biological changes that characterize the period. These alterations bring about an intensification of the primitive impulses and drives which threaten the capacity of the ego to cope with them and to adapt. The need to achieve independence calls on urges and drives other than the sexual in order to provide a self-determined outlet for aggressive feelings. Rebelliousness is not only against parental pressures but against the imperfectly formed and now changing super-ego or conscience. The latter has not matured sufficiently to function freely in the adult world where parents and other authority figures exhibit a contradictory and flexible set of values. Thus the adolescent is anxious to reach adulthood but terrified by its inconsistencies and prospects.

On the positive side, one must recognize in the adolescent a resiliency which is remarkably protective. The youngster is far less bothered by his mood vacillations than are his parents. His value judgments, in their simplicity and straightforwardness, are openly expressed and unashamedly exposed. Fantasies are more bound to reality and less apt to be susceptible to highly symbolic interpretation.

The existence of different stages or phases of adolescence which the Rorschach has projected has also been verified in treatment of boys and girls between 12 and 16. Geleerd (5) sets aside three developmental eras, 12 to 14, 14 to 16, and 16 to adulthood. Of these, the child from 12 to 14, the early adolescent, is the most difficult to treat. In this age range, group identification is intense, rebelliousness against the parent is most apparent because it is so new and attractive and earlier reaction formations become of less binding force. Habits of cleanliness, care of the body, hair-cuts, eating behavior and table conversation become loose and slovenly. The effect on fathers and mothers is obvious. In addition, with girls, increased expenditures on and interest in clothes come out together with the exaggerated use of lipstick and telephone. Behind these behavior manifestations one must read the pressures exerted by sexual differentiation, penis envy, competitiveness, and the recrudescence of anal-oral conflicts rather than genuine interest in cooperative and heterosexual activities.

The second phase, from 14 to 16, finds adolescence at its physiological and psychological peak. Preoccupation with the self is at a climactic state. The struggle between increasing libidinal demands and ego and super-ego controls is maximal. Narcism is the characteristic solution. Fantasies are easily available for discussion if not for interpretation. Parental figures now are rejected violently because they are in a more adult sense, sexual objects whose threat as incestuous stimuli is very great. In addition, the parent fosters both the cathexis and the rejection by his or her seductive attempts to establish a so-called closer relation to the child. Since the parent is rejected, the parental system of values is likewise discarded. Finally social pressure and academic emphasis upon maturity make for continual denial of the parent as a guide. At this time, the need for support from sources outside of the parent is focal. Crushes and attachments to non-parental authorities develop. Here the therapist has an advantage over the preceding stage in working with the middle adolescent. He is accepted as a parental surrogate but not in the same transferential manner as the adult accepts him. For the therapist, this readiness to accept and use the therapeutic relationship has some built-in pitfalls. The appeal to therapeutic omniscience and omnipotence is great and the danger of manipulative acting-out of the therapists' needs is ever present.

Of the end stage, the 16 to 18 year phase, there is relatively little to be said. Here the tasks of the therapist are much more like those in adult treatment. The lessening of rebelliousness, the heightened sense of place in the school and work world, the evolution of clearer sexual attitudes and acceptance from age-peers make the upper teenager who has survived the perils of the first two stages an adultoid individual.

In the light of this rather lengthy exposition of the normal youngster between 12 and 18, what can be said about treatment? This question breaks down into several subtopics; (*a*) motivating the individual to come for help; (*b*) goals in treatment; (*c*) difficulties in analytic work and (*d*) specific techniques for this age group.

Motivation for treatment rarely comes spontaneously from the adolescent. It is usually the parent, under prodding from the school, who precipitates the initial contact. This, in turn, makes the task of the therapist difficult, for it puts him in the position of allying himself with the parent. To the patient, it is as if the therapist has already accepted the parental evaluation of the child's problems and personality and hence the rejection of the parent is transferred to the therapist. From our discussion of the differing personalities of the various subgroups, it is clear that resistance to treatment is greatest in the first stage, only slightly less in the second and not a significant factor in the third phase. As a matter of routine, the first appointment is usually with the parent who wants to know if the child is treatable at all and second, how to get him to accept therapy. For the psychologist-analyst, his possession of psychometric skills is an advantage here for he can present himself to the child as an objective, non-parent whose special training is in the evaluation of normal personality. Thus, the first step in making the therapist an ally of the patient can be accomplished. All the therapist has to do is to explain to the adolescent that he wants to find out whether there is a problem, that the parent's picture of the individual is rarely unbiased and that it is to the advantage both of the child and the therapist if one has a clear picture of what the youth is really like. Few adolescents maintain their resistance in the face of an offer to be objective about them, an objectivity based on tests. Here one can use the patient's experience with testing in the school as in instrument for motivation. Further, one can employ the narcism and self-concern of the adolescent as a mechanism for going into the test results in detail. So much mystery surrounds the use of measurement in the school environment that the youngster readily rises to the offer to let him know exactly what the facts are as uncovered in testing. It follows frequently from what has been stated above as to the normal abnormality of the adolescent that the need for treatment is non-existent. Even here, the contact with the patient can be used to help him or her see what the parent feels is so out of line and to do limited guidance in how to live with one's parents.

Where the analyst feels that treatment is necessary, the task at the onset of the relationship is still to ally oneself with the patient. Alliance is more than a matter of taking a position. It involves a real understanding of the world of the adolescent with its unique semantic system, its concentration on horses, hot rods, customizing of cars, hacking around and the multiform language of the age. The therapist has to speak with the adolescent in the language of the adolescent. This sets the stage for the next step in the motivational process. Whereas, with the latency and prelatency child, the patient can tolerate the visits of parents to the therapist, such contact is rarely tenable for the adolescent. In Menninger's sense a contract has to be established with the patient which sets forth clearly and unambiguously the conditions under which consultation with the parent will be a part of treatment. I can conceive of no situation in which material confided to the therapist by the parents should not be shared with the adolescent. The only danger that exists lies in what will happen when the child reveals that he knows what the parent has said and uses this information to intensify the hostility and aggression against his forebears. Here again, such intensification of conflict provides much material for analysis and discussion in the sessions. It is common experience that the confrontation of the parent with material emanating from parental conference with the therapist diminishes rapidly as treatment progresses.

Since problems centering around values and value-oriented behavior constitute a large part of the difficulties which bring adolescents to treatment, it is necessary early in therapy and as soon as possible to impart the therapist's attitudes to the patient. The line that must be taken is that acting-out in an anti-social and group disruptive way is a disapproved behavior whose reasons must be understood and yet whose punishment is outside the jurisdiction of the therapist. Here too, it is necessary for the analyst to be aware of his own feelings toward such infractions and his repression of his memories of his own transgressive behavior in youth. If one can communicate the commonness of the experiences and the feelings of the older person during the equivalent life era, the task of establishing a proper kind of rapport is facilitated. Since one of the needs of the pubertal child is for a relationship with a non-parental adult, it is not hard to establish such an atmosphere, provided the punitive aspects of the parent are avoidable.

What then are the goals of the therapist with the adolescent? The first step in setting up a treatment plan is to gauge the depth of exhaustion or resiliency of the patient's ego, his capacity to form relationships and to accept some guidance. In the non-institutionalized youth who is seen in private office practice, the initial interview easily yields leads to such an evaluation. Keynotes here are the quality and quantity of rebelliousness, whether it is sullen or openly enjoyed; the amount of withdrawal, whether it is from parental figures or has spread to the peer group; the amount and kind of fantasy life, whether it is easily related to the therapist or merely implied; the amount and quality of disturbance in educational accomplishment. In the initial stage of therapy, the practitioner must seek to establish himself as a pseudo-ideal and ally for the ego of the child. From the establishment of this attitude comes the second phase, the effective imposition and acceptance of behavior standards. This enables the therapist to control acting-out tendencies but with a caution, namely, that the role of the corruptible parent who can be easily manipulated be avoided. To be an ally on the side of the affects and a positively reinforcing reward on the side of control over disruptive behavior is no mean accomplishment but one that is fundamental in adolescent treatment. Following this period, the task is to set the stage for the acceptance of interpretative activity by the therapist. This is a slow process since the adolescent is so reality-bound that he rejects initially all attempts to explain behavior in symbolic terms. A further danger of too rapid interpretation is that the id forces are so readily stimulated and the ego apt to be so weak that interpretation may serve as a license for the acting out of primitive impulses and the intensification of conflict rather than its amelioration.

With these more or less general background considerations, we come to the technical problems of treatment. Here the main key is flexibility and tolerance on the part of the treating expert. By tolerance is meant the ability of the therapist to deal with the resistances and rebelliousness of his patients. He must recognize and dig for the anxiety behind these maneuvers. Unless this is done rapidly and handled with expedition, there is danger that the patient will leave treatment. To allow the adolescent to stew in his own juices, to sit silently and resentfully while the therapist is absorbed in waiting him out is rarely effective with this age group. The invisible cloak of anonymity can safely be donned only during the upper or end period of adolescence. If tried earlier, it simply reinforces the fears of the youngster. Active attempts to get to the patient are almost mandatory. How to do this depends on what the therapist can pick up in the way of an entering wedge from the initial conferences with the parents, teacher, school psychologist or family physician, the usual sources of referral. One effective approach is to throw at the patient the description of him or her as it is obtained from the referring person. Fortunately, the anxiety and guilt of the parent will exaggerate the picture so that the child will respond to the distortions. This then opens the door for the therapist who can ally himself with the patient against parental over-emphasis on certain difficulties and character failings.

One frequent type of presenting complaint offers an opportunity for the therapist to get at some of the repressed feelings which haunt the adolescent. This situation is the fixation of the patient on a single activity. Girls of adolescent age talk of nothing but horses while their compeers of the opposite sex are car-customizers, drag-strip obsessives or enthusiasts and experts in a single sport, rarely as participants, concentrating on collections of data about their favorite activity. Such repression and fixation leads to endless discussion of various phases of the preoccupation. All that is talked about centers on the one field of interest. Here, if the therapist can guard against boredom and develop the language and interest of the child, the negative transference will be weakened. Furthermore, since the preoccupation has more of the obsessive than of the sublimative symtomatology and dynamics it is imbued with symbolic significance. The almost undirected speculation by the therapist about the significance of a horse or a car can bring the patient to ask questions about symbolic behavior. This, in turn, leads to a discussion of different types of symbolic representation, dreams, masturbation fantasies, slips of the tongue, etc. Once this entree has been gained, the transition to the earlier history of the child is relatively easy.

Since the neurotic components of the adolescent's evaluation of reality are not as firmly imprinted as in the adult, and, as Piaget has discovered, his mode of thinking is system constructing and system testing, the amount of clarification about symbolism by the therapist is minimal. The youngster will carry on almost by himself, constantly revealing to the alert listener the sources of his anxieties. In many instances the insight that the adolescent gains is more striking and exciting than similar lightning flashes in the adult because of the greater childishness of the patient and his greater delight in his own power to interpret and understand his behavior. The indications for this type of therapy are difficult to establish. Oedipal material easily comes out in treatment. The problem with a given individual is whether this material is so easily elicited because of weakness of defenses or whether it is close to the surface because of the patient's readiness to handle it. In the former case, there is a danger that the patient will use the insight to justify acting out the released feelings. Here again, the prior nature of the therapeutic relationship is crucial. If the therapist has been able to establish some control over the reactive tendencies of the youngster, he can safely allow the insights to be explored.

From what has been said thus far, it is obvious that there is little validity to the contention that analytic treatment cannot be applied to the adolescent. The statement is true only if one defines analysis as the traditional, non-active, stereotyped methodology. Orthodoxy of any type is probably contraindicated for any dealings with the adolescent youngster. However, the basic goal of the therapist remains essentially analytic, namely, the understanding of the dynamics underlying the unconscious motivations and conflicts of the patient. In this respect, work with various age groups is the same if it is to be analytic treatment. The great difference in the handling of adolescents is the relatively greater emphasis on the functioning of an intact ego and on the role played by the therapist. It is even probable that the therapist must be more careful to recognize and deal with his countertransferences in this age period than either before or after adolescence. The adolescent requires a delicate balance of authority and humility from his therapist since he is so sensitive to the insecurity and the self-defensive maneuvers which characterize his relationships to his parents. The reactivation of the therapist's own adolescent difficulties and conflicts is a frequent source of trouble in work with adolescents.

In addition to the unconscious conflicts in the patient and in the therapist, there is another area of concern. This is the adolescent's need both to strive for independence and to do so by attachment to substitutes for the parent. These tendencies in the youngster lead to the confusion found in writing on this subject where patients in this age group are described as resistant to treatment and at the same time eager for help. If the therapist does not recognize the specific needs of the patient at various stages in his development, he cannot fairly expect collaboration from the young person who is anxious to have these needs understood and clarified. The key word in the treatment of adolescents is not the "should" but the "need." By this is meant that the therapist must not enforce on the patient what he as an adult thinks the young person should do but to emphasize what the adolescent needs within himself. This requires an exceptional degree of both empathy with the patient and emancipation from adult personality.

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ERRATUM: THE DETERMINATION OF SOME VISUAL FUNCTIONS OF A UNILATERALLY COLOR-BLIND SUBJECT: METHODS AND RESULTS

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On page 20, of the original article,* second line of the first complete paragraph, the sentence, "The bands . . . slit of the spectrometer," implies an incorrect procedure that gives an erroneous estimate of band width. A more correct result was obtained with a narrow entrance slit of the spectrometer. Other measurements were made by means of a Beckman spectrophotometer involving the determination of transmittances for various positions of the graduated interference filter relative to its 0.5mm slit. Results were as follows: a band with maximum transmittance at 450mμ has a width of 12mμ at half maximum transmittance; a band with maximum transmittance at 554mμ has a width of 14mμ at half maximum transmittance; and a band with maximum transmittance at 656mμ has a width of 11mμ at half maximum transmittance.

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* The determination of some visual functions of a unilaterally color-blind subject; methods and results. *J. of Psychol.*, 1961, **51**, 3-32.